













# Forecasting for Profit

A TECHNIQUE FOR  
BUSINESS MANAGEMENT

By

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## PREFACE

This book is chiefly addressed to three types of readers: The business executive, the professional economist serving enterprise management, and the student intending to develop a career as a professional economist.

This is a book on the technique of using economic theory in managing the affairs of a business enterprise. Since it is a treatise on practice, the treatment of economic theory has been limited to an outline of those major factors and relationships which should be understood and considered by professional economists and enterprise management. Only the elements of practicable economic theory have been described, and these only to the extent essential to the purpose of explaining how such concepts can be used in the process of producing and distributing commodities efficiently. Because of this approach, the book may be considered as an outline of how economic theory may be linked to business practice.

It has also been my intention to describe some of the more important functions which a professional economist may perform for the executives who manage a business. This aspect of the book is intended to serve the needs of those scholars whose experience has been limited to a study of works on economic theory and statistics but who have had little contact with either markets or an actual performance of the functions of production, distribution, and business finance. On the other hand, the experienced executive sometimes is unable to tap the resources available to him in the form of knowledge of how the economy is organized and how it functions. This book is intended, therefore, to enable the student of economics to be most useful to the management of a business and to assist the executive in understanding how to use a professional economist.

As this book goes to press, the estimates of national income and income payments are being revised by the Department of Commerce. When these revisions are available, it will be necessary

is a matter of detail, however, and will not impair either the usefulness of the tables or the techniques described.

I wish to express my deep appreciation to the management of the Armstrong Cork Company for permission to describe some of the practices and policies which have been employed in operating the business. My indebtedness to my fellow employees for many years of instruction and co-operation is exceedingly great. In particular, I wish to thank Mr. Henning W. Prentis, president; Mr. C. J. Backstrand, first vice-president; and Mr. R. L. Bowles, manager of production planning and inventory control, for their contribution to my education in the problems of management and their helpful criticism of the manuscript.

In writing this book I owe much to my friends among the professional economists. Among these Dr. Nathaniel R. Whitney, economist, The Proctor and Gamble Company, and Mr. L. LeBrec Micoileau, assistant economist, General Motors Corporation, reviewed and criticized the manuscript for content. To them goes my gratitude for their able assistance.

To my friend Mr. H. B. Gates I am indebted for his thorough criticism of the text and to my assistants, Mr. C. R. Jones and Miss Mary E. Grebinger, goes my deep appreciation for the many ways in which they have helped me to produce this book.

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## CHAPTER I

### BUSINESS FORECASTING

During the past two decades more and more businessmen have learned the value of using economic forecasts in planning the affairs of the companies which they manage. The increasing acceptance of formal economic forecasts by management may be attributed to a wide variety of causes.

In the first place, young men educated in the theory of business and financial administration have attained positions of responsibility in many companies. The excellent courses in business administration and finance, given in American universities and colleges, have affected the managerial techniques employed in modern enterprise. Men trained in these institutions have been inclined to obtain the most comprehensive knowledge available concerning the factors which largely determine the results of their business ventures. Consequently, the operations of more businesses have been subject to the influence of men who try to minimize the effect of chance as a factor determining success or failure.

It has also been evident that progressive executives have been aware of the advantages to be obtained by delegating to specialized members of management the function of obtaining information on the probable development of economic affairs in the future. Apparently the managers of banks and other financial institutions were among the first to understand the advantages of having objective professional advice in regard to the current and future economic situation. More recently, commercial and industrial enterprises have found it profitable to support and use the services of professional economists. In many companies such specialists are still given titles which label them as individuals dealing with statistics, it probably being thought that more confidence could be placed in figures than in explanations of the meaning of such measurements. This toe-in-the-water phase of employing economic theory is passing, as is indicated by the increasing use of the title "Economist" by progressive enterprises.



Acting as a member of management, the economist contributes, by reason of his specialized background in economic theory, the opportunity to exchange ideas with other members of his profession, the capacity to analyze abstract problems, a knowledge of the particular problems of a business, and the ability to devote his whole time to the task of providing the rest of the management with essential background information. The work of persons able to make such contributions—no matter what their titles may have been—has improved the quality of business forecasts and, thus, widened the acceptance and use of such instruments.

An increasing number of businesses have found sales estimates, in particular, to be useful in guiding and controlling operations. Probably the widening acceptance of company operating budgets has been of considerable importance in stimulating business managers to find ways and means of developing realistic and useful sales estimates. The literature on budgetary control frequently begins with an admonition similar to that given in the famous English recipe for making rabbit potpie. "First catch a rabbit." For it is quite evident that the most useful budget employed in a business must begin with a forecast of future sales which will be a fairly accurate approximation of actual results.

In some cases the painful shock of recurring inventory losses has induced business executives to use economic forecasting as a means of avoiding this kind of waste in the future. Management has hoped that money spent on economic research would yield a return by reducing inventory losses. A business may lose large sums if inventories and commitments are high at a time when the cost of producing the commodities concerned soon will be reduced. But before a decision can be made either to reduce or to increase inventories, a forecast based on an adequate understanding of the economic situation should be available to the decision-making management. Businessmen must speculate, regardless of their desires. Anyone who is obliged to deal in fluctuating values is engaged in speculation.

Nor is the management of a business entitled to assume that a constant minimum inventory policy is an effective means by which inventory loss may be avoided. The use of such a procedure actually guarantees inventory loss over the long term, for losses are sustained on large inventories while gains are made on small stocks. Furthermore, a constant inventory policy, in

which requirements are covered in terms of a certain number of months supply, tends to accelerate the cyclical movement of the demand for raw materials and acts as an unstabilizing force in the economy.

Intelligent production planning may be used as a means by which operating costs and investment in fixed capital assets may be reduced. Production planning also is an instrument with which to stabilize employment and improve industrial relations. The increased acceptance of production planning has widened the demand for adequate economic forecasting of professional quality—for production can be planned most effectively only when some measure of confidence can be placed in the sales forecast and other estimates which must be used.

In some instances it may be observed that the use of carefully developed forecasts has revolutionized the attitude of management toward inventories. Instead of considering that inventories are a necessary evil, they have adopted a more constructive attitude. Inventories can be a source of profit. In ordinary accounting procedure the profits made on inventories are buried in the operating profits reported, while the losses sustained on inventories are isolated. Because of this peculiarity in accounting procedure, the fact that profits can be made on inventories frequently is not understood. Actually, adequate production planning and inventory control can augment profits by reason of the facts that operating costs and fixed capital investment are minimized, customer service is maximized, and speculative gains on inventories are not exceeded by inevitable losses. This kind of production planning cannot be employed unless properly conceived custom-made economic forecasts are available.

Economic research for the purpose of making rational forecasts is also being employed for other purposes by prudent businessmen.

When expansion of the capital assets of a company is contemplated, it is important to know whether it is probable that the estimated level of sales on which the capital expansion is based will be maintained for an extended period of time, or whether it is reasonable to presume that sales will be reduced to the point where the new capital assets will not be used but will represent only a burden on the business.

Forecasting is necessary if efficient use is to be made of per-

sonnel. If the demand for a certain product is decreased temporarily, it may be unwise for the management to reduce the organization required for either producing or distributing the product. It is expensive to train persons who can produce or sell goods with efficiency. Furthermore, it is both wasteful and poor labor relations to be obliged to pay unemployment benefits or separation payments to workmen who shortly will have to be re-employed for the very jobs from which they were discharged. It follows that a management which depletes an efficient manufacturing or selling organization, during a temporary dip in business, may be seriously impairing the efficiency of the enterprise and will be outperformed by competent competitors. Conversely, if a management seeks to maintain an organization which is not useful—and one for whose efforts the customer will not pay because of a continued decline in the demand for the products—these executives are traveling the road which leads to business failure.

Sometimes a foresighted management increases advertising and other merchandising effort in anticipation of a rising trend in customer income. By this means a most efficient use may be made of dollars spent for sales effort. By following such a procedure, selling expense, as a proportion of income, will be largest during the early stages of a continued rise in customer income. When it is estimated that customer income will be reduced in the not distant future, merchandising expense should be at a low level relative to income. The common practice of devoting a fixed proportion of income to advertising and other merchandising effort may be expected to result in considerable waste. By following this technique, a small amount of money is spent when selling expense will yield a maximum return—as is the case when customer income is at the beginning of an extended rise. Conversely, the largest expenditure relative to income is made when the future yield will be least: namely, just before customer income begins to decline for a long period owing to an unhealthy state of affairs in the economy.

Rational economic analysis of the trend of long-term demand for the products of a business often will indicate the desirability of conducting an intensive review of the merchandising and manufacturing practices being used in connection with particular commodities. Economic analysis, also, may be a means of indi-

cating the waste involved in spending managerial effort on products which may have been profitable in the past but which will not continue to be so in the future.

Although many companies have found it profitable to use intelligently conceived economic forecasts, the practice is far from universal. It is still widely assumed by management that there is little that can be done about obtaining reasonably correct forecasts of the future general economic situation. For this and other reasons, it may be observed that some businessmen frequently rely on a consensus of other successful responsible businessmen to establish their own opinions. There is much to be said for this approach. One particular advantage is that whoever uses this practice will have plenty of good respectable company when the common opinion turns out to be wrong.

It is illogical to attempt to forecast what the volume of sales will be for a specific product, company, or industry, unless the estimators command a fairly accurate understanding of what broad economic changes actually will occur in the economy. Every business is affected by changes in the credit structure of the Nation; by changes in the inventory policies of other producers; by changes in the expectations of suppliers, customers, and investors. Ever since the institution of the Federal Reserve System, the rediscount rate and open-market policies of the Federal Reserve Board have had an effect on business activity. For an indefinite time in the future, government fiscal policy must be considered of great importance as a factor influencing the level of sales obtainable by most privately owned business enterprises. The effect of government control over prices and wages (which may be also construed as government control of the profits of many enterprises) must be evaluated in establishing the sales forecasts for a product.

Because of the great number of intangible variables to be considered in forecasting future economic conditions, many businessmen have concluded that the task of making a forecast in which reliance could be placed is beyond the scope of individual, or even human, ability. Others have placed major reliance on "experience" alone. It may be observed that such men frequently can make an adequate estimate of future sales, or some other important economic factor, and yet are unable to explain how they arrived at their conclusions. Many of the factors which an expe-

rienced economist would use in explaining how he arrived at approximately the same forecast would not be mentioned by the sophisticated businessman. Nevertheless, the economist and businessman might arrive at approximately the same judgment. In modern business practice, the economist frequently is used to check the judgments of experienced top management to insure the fact that no factor of importance in determining the level of business operations has been overlooked in company planning.

There are a number of reasons why the acceptance of economic forecasting of professional quality has been accepted by business management only in the comparatively recent past. One factor which has delayed the more widespread use of professional economists has been the fairly common impression among practical businessmen that all economists laid end to end could not reach a decision. In part, this impression has been due to the inadequacy of both the measurements and the theories which the economist has been obliged to use for lack of anything better. Fortunately this situation is being improved. Then, too, the experienced practicing economist has learned the absolute necessity of dealing with all the important visible aspects of a problem in practical economics. The use of this method of approaching a problem in business management may be very annoying to successful executives who are accustomed to making and acting on their own snap judgments.

It also may be observed that the very training of an economist is apt to impair his ability to make a definite decision. The time spent studying abstract situations involving many variables may produce a state of mind in which many answers may be conceived to almost any problem—there being no single choice upon which action can be taken. Anything becomes possible, and nothing is probable. This not uncommon state of mind may be considered an occupational disease of persons who labor diligently at being "intellectual."

Businessmen, however, are obliged to make decisions and take definite action. It is seldom that a "large" quantity of raw materials is bought by a purchasing agent. He generally orders an exact quantity of materials at a specified price. An operating budget cannot be based on an "increased" volume of sales. Someone must state exactly how many dollars worth of sales will be used in the estimate on which a budget is based. Although it is

seldom the function of an economist in a business to make operating decisions unaided, it is essential that he be definite enough in his own judgments to enable line executives to use his advice.

The most effective use of the services of a professional economist can be made by executives who have an adequate understanding of what can be accomplished by such a person. It also is important to know what he cannot be expected to do. Because an economist can forecast sales or a change in the price of a particular material, there is no reason to promote him to the status of a wizard, swami, or crystal gazer.

Both the businessman and the economist, when engaged in making a forecast, try to understand and describe the specific results of economic and political action taken by human beings. Persons are not machines, and human activity in the future is not predictable in the same way that the results obtained by combining definite quantities of certain chemicals under controlled conditions are foreseeable. Anyone who makes a decision regarding what kind of a product customers will buy, how much they will purchase, how efficient competing enterprises will be in producing new products, whether inventories are high enough to justify caution in holding or increasing them, and whether or not equity prices are low relative to current earnings and prospects, is making a decision in regard to human behavior. This remains true no matter how many mathematical measurements have been used concerning the matter under consideration. Statistics dealing with economic life merely are symbols of some of the elements of a situation. The tools of the useful practicing economist are statistics of indeterminable accuracy, a knowledge of how people have acted in the past in situations which have been similar in some respects, a disciplined mind, knowledge derived as a result of critical observation, imagination, and common sense. With these instruments he endeavors to determine what people will do in the economic situations in which they will live and what the results of their activities will be.

Because both the businessman and the practicing economist must make judgments concerning human behavior, their competence to make such judgments is important. The judgments used in business management are not "scientific," nor is the method of arriving at them "scientific." The use of the word

"science" in connection with the practice of economics is merely an attempt to gild a fund of knowledge, with the sacerdotal aura currently associated with experimental science. Consequently, it is proper to consider that both businessmen and economists are practicing an art or craft when engaged in making forecasts of economic activity. Furthermore, since the quality of craftsmanship is determined by the ability of the craftsman, the accuracy and usefulness of an economic forecast largely depends on the competence of the economist or businessman to perform such specialized work.

Experience in the practice of business forecasting should lead to a realization of the fact that the economist must deal with "situations." These situations are complex in the sense that they consist of a number of elements, many of which are mutual determinants. For example: The situation in respect to the probable future price of a product is composed of all the factors which, in combination, will determine the price at which the product will be sold on the market. The supply of a product is influenced by the demand, and the demand is influenced by the supply, with the price being the result of the relationship between the two. As may be seen, this common type of situation is exceedingly complex. Unfortunately, there is no known method by which the status and interrelationship of the elements in most such situations can be analyzed in a truly scientific manner. For this reason the practicing economist is forced to use observation, reason, and judgment rather than the technique of experimental science in the development of conclusions.

The first step to be taken in analyzing a problem in economics is to determine and isolate the component elements of the situation involved. After this is done, it becomes possible to obtain and study those facts which appear to be pertinent to the elements of the problem situation. Finally, an attempt is made to understand the way in which the component elements apparently determine or affect the situation as a whole. By these means an understanding of the situation and a comprehension of the probable development to be expected may be obtained. It is obvious that an important weakness in using this technique is that so much reliance must be placed on reasoning and judgment. Because the resolution of the most important problems in business must be made on the basis of reasoning and judgment, it is

essential that all the apparent facts pertinent to the situation should be recognized and considered in the development of conclusions on which action is to be based. Actually, judgments worthy of confidence are made only by a rational integration of the maximum number of discernible facts which apparently are of importance in a situation under consideration.

In practice, some of the elements of an economic situation may not be even comprehended. Many situations in economics are so complex that it is questionable whether or not anyone can completely understand them; nevertheless, it may be observed that common practice in economic forecasting could be improved considerably. Most of the situations encountered in the conduct of a business are susceptible to rational analysis for the purpose of developing judgments worthy of confidence and use by an operating management.

In some respects, the task of forecasting future conditions in the economy is similar to the problem of analyzing the results of the integrated activities of different parts of a complex organism. Such complicated interrelationships exist between the different elements of an economy that it is possible to think of our economic society as resembling an exceedingly complex living organism. It is organic in the sense that a maladjustment of one element of the economy may induce important effects on other parts either with remarkable rapidity or even after the passage of years. The economy is dynamic, or alive, in the sense that it is always being changed. This is a result of the apparent fact that the motivating force of economic activity is human action caused by individual reason, emotion, desire, greed, hope, pride, fear, and other mental and glandular processes.

In the following pages are described certain methods which have been employed with success in making reasonably accurate forecasts for use in planning the affairs of the Armstrong Cork Company as well as other enterprises engaged in manufacturing and distributing a wide variety of products. The description is intended to outline the different economic factors which should be considered in making forecasts, how information on these factors can be organized, where data can be obtained, how forecasts may be developed, and how these estimates can be made useful.



## CHAPTER II

### THE FORECAST

Probably the most important single forecast used by the management of a business is the sales forecast. A privately owned business exists to produce and sell commodities at a profit in competition with other enterprises. It follows that the quantity of goods to be produced and the price at which such commodities will be sold are important measures of the activity of the enterprise and affect the magnitude of the profits obtained. Consequently, practically all other forecasts used in planning the affairs of a business enterprise depend on a sales forecast. This is true of estimates which may be made concerning future profits, change in products, capacity requirements, organization, competitive effort, capital requirements, inventories, etc. These may be termed the "internal" forecasts, because these are estimates of the situations within a single company which are wholly or largely controllable by the management.

On the other hand, the sales forecast is based on other forecasts concerning future economic conditions, probable efforts by competitors, political situations, changes in technology, cultural developments, etc. These estimates may be termed "external" forecasts, because the situations would exist even if the company concerned did not, and, therefore, they are external to a company.

The sales forecast is a link between an evaluation of the external factors affecting the operations of a business and the effects of the conduct of the internal affairs which may be controlled by the management.

Consequently, the sales forecast of a well-managed enterprise must be based on a careful adequate study of external situations, in order that the management may control the internal operations of the company in such a manner that the most satisfactory results possible may be obtained. This characteristic of a sales forecast—the fact that it is a link between uncontrollable and controllable situations—should be recognized. It is not difficult for a

management to confuse controllable situations with uncontrollable ones and to indulge in wishful thinking, with the result that sales forecasts and all the dependent estimates, including the profit estimates, turn out to be pure fiction.

Forecasts result from judgments and assumptions made by management. Actually a useful forecast is the result of a multitude of judgments which have been made about many different matters. Because many of the situations which will affect a forecast are not precisely determinable, the judgment of the forecaster frequently must be based on incomplete or insufficient evidence. Yet business management constantly is obliged to undertake the risks involved in assuming responsibility for the results of decisions based on evidence which is not so complete as would be desirable. The necessity of making judgments based on incomplete evidence, however, should not be used by management as an excuse either to ignore unpalatable evidence or to neglect to collect and use as much pertinent information bearing on the problem being considered as can be obtained with the expenditure of a proper amount of effort.

Another manner of evaluating a forecast is to consider it as being a description of a situation which probably will obtain—while other situations are classified as being merely possible but not probable developments.

Possibly the most intelligent way to treat a forecast is to regard it as an assumption which it is reasonable to adopt in view of the evidence at hand, and with due awareness of the risks and opportunities to which a business will be exposed from the acceptance of such a point of view. The treatment of a forecast as a reasonable assumption makes it possible to extend the range of the external factors which may be linked to a sales forecast and the derived estimates. This is due to the fact that there are many elements of economic and political life which are not measurable or determinable with precision. When such an imponderable is encountered in the development of a forecast—as frequently happens—one solution is to adopt an absolute assumption in respect to the matter. Generally this is done when there is practically no way in which to establish a fully reasonable forecast. The exact date an armistice will be concluded in time of war is an instance of an event which may be dealt with by adopting an assumption.

A forecast is a description of a future situation. When expressed in figures, a forecast is also a definition. The elements of description and definition contained in a forecast enable the management of a company to plan future operations in specific terms. The measurements given are precise and will be equally definite and understandable to all members of a management in which different individuals are responsible for the performance of different functions. The use of a forecast enables top management to adopt an assumption relative to operations which all sections of the managerial personnel will use in divisional or departmental planning. In this way the activities of different managerial units may be organized and co-ordinated, and the general management may utilize the forecast as a means of setting the tempo of many important operations involved in the conduct of the business. Thus the forecast is an instrument by means of which the judgment-making ability of top management can be extended to all levels of management.

The precise figures of a forecast may be a source of misunderstanding. While it may be advantageous to forecast that company Q will sell 1,550,000 units of product Z in a given year, the very precision with which the assumption is stated may be a source of confusion. Once a forecast has been established and accepted, there is danger that those who use it will be inclined to think that it necessarily will be absolutely accurate because it is expressed in precise figures. The accuracy associated with the medium of definition may be confused with the definition itself. Consequently, when it is developed that the forecast is not absolutely accurate, those who have used it sometimes experience disillusionment. It may be observed that persons who at first place undue confidence in a well-prepared forecast are apt, later on, to be inclined to reject all forecasts.

Every forecast will be wrong in the sense that actual events will not be absolutely identical with those described. Several years ago the management of the Armstrong Cork Company established an estimate in which it was assumed that in the month of June of the future year 1,389,013 square yards of a particular type of floor covering would be shipped by the corporation. This forecast was made during the month of September preceding the June under consideration. The forecast for June was part of a forecast of sales during the future calendar year.

Ten months passed and in July the billings report for June appeared with 1,389,013 square yards in the forecast column and 1,389,013 square yards of sales reported. The figures were identical. Both figures were checked to make certain that they were correct, but no errors were to be found. This forecast was inaccurate, however, because the price at which the goods were billed was slightly different from the price given in the forecast. Furthermore, the assortment of sales in the subclasses of the product was different from that in the forecast. The forecast was useful but was not absolutely accurate. The forecast was useful largely because the estimates which had preceded it were reasonably correct, with the result that the management had been educated to make a proper use of forecasts.

It may be assumed that any forecast of future conditions contains an error. This is inevitable. What is important, however, is the magnitude and direction of the error. In some cases it is possible to determine the probable margin of error. At other times this is not possible. Because the utility of a forecast is increased if the probable magnitude of error is known, it is very desirable to indicate how much error probably is involved in an important estimate, if this can be done.

One way to determine the probable nature of the error incorporated into a forecast is to introduce a deliberate error or bias into the calculations. This is the mode adopted by individuals who establish forecasts on a "conservative" basis. Of course, the use of this technique requires an understanding of whether it is conservative to overestimate or underestimate. If the demand for a particular product is rising—and there is sufficient reason to conclude that the demand will continue to rise for many months to come—it may be "conservative" to overestimate sales for the purposes of making a cash budget, planning inventories, and, in some instances, advertising and other sales effort. At the same time it may be "conservative" to underestimate sales for the purpose of estimating profits. Yet, if this kind of conservative profit estimate is used as a measure of how much the sales department will be allowed to spend, the merchandising effort may be crippled, with the result that the enterprise may lose competitive position and suffer a decline in sales volume relative to that obtained by competitors.

On the other hand, when demand is declining and there is good

reason to assume that sales will continue to decline for some time to come, it may be "conservative" to underestimate future sales for the purposes of planning production and purchasing raw materials. In such a situation inventories generally are a source of loss, and losses may be minimized by reducing inventories as soon as possible.

The practice of deliberately introducing an error into a forecast for the purpose of determining the probable direction of error may be termed "positioning" the estimate. It is generally undesirable to manipulate estimates in this manner. Although the practice is useful in some cases, it is to be used with great judiciousness—and only when the risks involved in the use of an unbiased estimate are too great to be undertaken.

It is particularly inadvisable for a professional economist employed by a business enterprise to position his estimates. A professional economist is expected to provide top management with usable judgments. These judgments should be based on evidence relative to future economic situations which will affect the affairs of a company. Thus, the professional should deliver his judgments and indicate how much confidence the top management should place in the validity of specific estimates. But the final decision concerning the degree of bias, if any, that is to be introduced into the estimates should be a matter determined by the individual or individuals who must assume responsibility for the final results of operations.

It is important that the time period encompassed by a forecast be distinctly defined and understood. Some forecasts may be classified as long-term estimates. Others apply only to the short-term future. A clear understanding of whether a forecast is a description of a situation which is expected to obtain in either the long- or short-term future is very necessary for those who are going to use it; otherwise, a forecast of a situation which may obtain 18 months hence may be used as a statement of conditions in the next six months. In this instance, the business manager might adopt a position which would be a source of loss in the near future.

Every business is managed on certain assumptions or preconceptions which may be considered as long-term forecasts or estimates. It is evident that sensible people do not produce new materials or expand existing capacity requiring large-scale capi-

tal investment unless there is reason to believe that there will be a market for the products over an extended period of time and that a profit will be made on the capital employed.

A short-term forecast may be considered as a description of conditions during a part of the time encompassed by a long-term forecast. An accurate short-term forecast is useful in understanding and explaining how the conditions described in a long-term forecast probably will be developed. Conversely, an accurate long-term forecast is useful as a means of explaining the situation to which short-term developments ultimately will lead. Thus a short-term and a long-term forecast complement each other, and the development of one is a means of increasing the accuracy and utility of the other.

A forecast frequently is composed of the elements of "pattern" and "level."

The "pattern" of a forecast is an expression of the changes which are expected to occur during the time period of the forecast. If the forecast pertains to sales during the future calendar year, it generally is of importance to describe the monthly trend of sales. Perhaps the monthly sales will increase during the year—or it may be estimated that sales will reach a high during the middle of the year and be much lower at both the beginning and end. When it is anticipated that business will rise for 18 to 24 months and then be subject to a substantial decline, it is evident that the forecast is one of a pattern of development. For many purposes, pattern forecasting is of the utmost importance. This is true of forecasts which are employed to determine policy used to control inventories, purchases, investment, etc.

Forecasts which include assumptions concerning turning points in the business cycle are forecasts of the pattern of developments. Dependable and reasonably accurate forecasts of the time at which a long-term rise in demand will be reversed—or a long continued decline in the price of a specific raw material will end and a continued rise begin—are exceedingly valuable if made by someone in whose judgment a management may place confidence.

Most forecasts incorporate a definition of the level of some form or other of economic activity. The idea of different levels may be combined with the concept of a pattern of change. An estimate that X company will sell \$5,438,000 of a particular product in a certain year is a forecast of the level at which sales

will be obtained. It frequently happens that a forecast of the level of sales will be modified when converted into a forecast involving a pattern. Contrariwise, if a pattern forecast is first developed, it often must be modified when a forecast of the level of sales, etc., is made for the same time period. Each form of estimate provides a means of checking the reasonableness of the figures established in the other type of estimate.

It is interesting to note that a spread in the acceptance of budgetary control by business management led to the development of formal estimates of the probable level of economic activity in the future. With the adoption of budgetary controls, management was forced to put down an actual, precise statement of expectations in terms of the volume of sales, expense, profits, and the level of prices.

Pattern forecasts have been used in business for a much longer period of time. All speculative activity is guided by pattern forecasts which may or may not be expressed as formal estimates.

The important difference between a pattern and a level forecast is that the pattern forecast is an expression of the timing of change, whereas the level forecast is a definition of volume anticipated during a period of time.

A forecast generally must be designed for a particular purpose. It should be tailored for the requirements of a specific business in a definite period of time. This is particularly true if the forecast is "positioned" by the introduction of a definite bias in an attempt to make the forecast conservative. It not infrequently happens that a forecast, deliberately made conservative by virtue of a reduction in the figures, is employed for a purpose for which it was not intended. Perhaps, in such an instance, a really conservative forecast would be one in which the figures would be increased above those which represented actual expectations.

An instance of a situation in which confusion may have been the result of the misapplication of a conservative estimate may be described as follows: A competent economist made an estimate of the probable postwar demand for certain products at the request of a number of companies in an important industry. The estimate was intended to be conservative in the mind of the economist. Consequently, he reduced his estimate to a level lower than that which he actually thought would obtain. The par-

ticular industry involved was one in which the existing companies were fearful that they would be subject to increased competition from new companies. The existing enterprises feared the competition of established companies which might expand their operations by manufacturing the products of the industry under consideration. Presumably the best way for the established members of the industry to prevent the entry of newcomers and to retain their position in their industry would be for them to expand existing capacity to satisfy the demand for the commodities which they produce. It would also be sound strategy to keep prices down to a level which would yield a satisfactory profit for efficient established enterprises, and yet which would not be large enough to attract new enterprises into the field. Under these circumstances the "conservative" estimate of postwar sales, if accepted and used for capacity planning by the executives who received the forecast, might very well result in offering newcomers the opportunity to invest money in the capital assets of the industry, become established, and make a profit by doing so. A more useful estimate for the industry would have been a statement of how high the sales of the industry might be expected to go, how long and under what circumstances sales might remain at the maximum level, and how low sales might be after the period of extraordinary demand.

The practice of picking up and using publicly aired forecasts indiscriminately—even when such judgments and estimates are made by competent authorities—is apt to be a source of considerable loss to the management of an enterprise indulging in such tactics. Still worse is the misapplication of estimates developed within the management of a company, for in this instance there is no excuse for not knowing for what purpose the estimate was intended.

#### THE FORECAST

1. A sales forecast is a means of linking an evaluation of the external uncontrollable factors affecting the operations of a business to ideas of what can be done by management to adjust internal controllable affairs of a company to the external situation.
2. Forecasts may be defined as being:
  - (a) Descriptions.
  - (b) Definitions.
  - (c) Assumptions subject to revision.



(d) Instruments used for the following purposes:

- (1) To control operations.
  - (2) To organize and co-ordinate the activities of functionally specialized managerial personnel.
3. The direction and magnitude of error in a forecast may be determined by deliberately introducing bias in the estimate.
  4. The time period encompassed by a forecast should be distinctly understood by those who use it.
  5. A short-term forecast should be integrated with a long-term forecast.
  6. A forecast may be a description of a probable pattern of development in an economic situation. Such an estimate may be called a "pattern" forecast.
  7. A forecast may be a definition of the volume or level of activity to be experienced during a particular period of time. Such an estimate may be called a "level" forecast.
  8. Most forecasts should be designed for a particular purpose or use. Ordinarily estimates should not be used for purposes other than those for which they were intended.

## CHAPTER III

### FACTORS WHICH DETERMINE SALES AND PROFITS

An attempt to forecast the sales and profits of a particular business without understanding what factors in combination will determine such matters is almost certain to lead eventually to disillusionment, frustration, waste, and loss.

A complete description of the reasons why a specific individual purchases a certain commodity would fill volumes if all the determining factors could be understood and defined. Yet nobody—including the buyer—can comprehend all the factors which cause a certain person to purchase a specific product at a particular time. It is only by observing numerous instances in which people produce or purchase goods and services that it is possible to describe the factors which apparently influence a majority of producers to create commodities and induce a majority of consumers to purchase them.

There are numerous ways in which the factors which determine changes in the sales and profits of a particular company may be defined and classified. One system of isolating determinants is given here. In this method of classification a preliminary separation is made between those factors which are largely subject to the control of the management of an enterprise and those factors which are not controllable to the same degree.

- I. Controllable or internal factors
  - A. The quality or utility of a product.
  - B. The cost of producing and distributing a product.
  - C. The managerial skill with which the affairs of an enterprise are adapted to the changing conditions which affect the business.
- II. Uncontrollable or external factors
  - A. The skill with which the managers of competing enterprises deal with the factors within their control.
  - B. The volume of activity in the economy, which is determined largely by:
    - 1. The expectations of persons acting as consumers, producers,

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investors, managers, speculators, legislators, political authorities, and as leaders of pressure groups in social life.

2. The status of economic organization.

- C. Economic "accidents," such as the discovery of new products; some strikes; the entry or withdrawal of enterprises into or from an industry; unusual weather; changes in products used by customers; political conflicts, wars, etc.

Selling prices are not classified as being either controllable or uncontrollable by the management of a company in a competitive industry. Selling prices affect the volume of demand and sales, and the relationship between prices paid and prices received determines profits. But because neither selling prices nor profits are always determinable by the management of a company, this important factor cannot be classified as being either controllable or uncontrollable unless the relationship of a company to competition is known and considered.

### PRODUCT UTILITY

It is difficult, or impossible, to make a realistic estimate of the future demand for a product if the effects of an important change in quality or utility are not considered when a forecast is made. It is essential to know how the product is used by customers, why people buy it, what potential unrealized uses may exist, what changes in the product would induce potential customers to use more of the commodity, what substitutes for the product are now being used, and what commodities might be replaced by the product. The answers to these and similar problems are derived from product and market research and must be available before it is possible to develop sales forecasts which management can use with confidence.

### COSTS

It is imperative to know what changes are to be expected in manufacturing and distributing costs, particularly in respect to the relationships which probably will exist between the costs incurred by a company and those of competing enterprises. It is necessary also to understand how the product is made, what proportion of total costs is represented by different elements, what technology is used by the company and by competitors, what raw materials are needed, what merchandising methods are employed

by the company and others, how much manufacturing capacity exists or will be required, where such capacity is located, the status of industrial relations, etc. It is evident that adequate knowledge of such matters must be derived from frequent exchange of information by the members of management responsible for sales, production, purchasing, personnel, research work of various kinds, accounting, finance, and policy making.

Some businessmen may object to listing manufacturing costs as matters which are controllable by the management of a company. Many managers find that the prices which they pay for the services of labor are not within their control. National political policy, changes in prices paid in local labor markets, and the use of force by organized labor have important effects on the cost of manufacturing particular products. In most instances, however, changes in manufacturing costs due to such factors affect an entire industry, and during some periods manufacturing costs are increased on a nationwide basis because of nationwide increases in wage rates. Consequently, even though labor rates are not always controllable by the management of a company, it generally is true that uncontrollable increases in wage rates experienced by one company occur when manufacturing costs in competing enterprises are being increased from the same cause, with the result that the major differences in manufacturing costs between competing enterprises are of controllable types.

### MANAGERIAL SKILL

The ways in which management adjusts operations to changing conditions depend to a large extent on a proper understanding of what problems exist. It is in the recognition and description of such managerial problems that an economist may be of assistance to the management of a business enterprise. This opportunity exists because one of the most important responsibilities of management is the function of adjusting operations to changes in the uncontrollable economic factors. These adjustments may greatly affect sales and profits. The continued study of these uncontrollable factors is a primary function of the practicing economist.

Effective forecasting also requires consideration of how the management of an enterprise will use a forecast and what the

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managements of competing companies may do about adapting their activities to changes in conditions which affect their businesses. Neither economists nor other members of management are completely rational or objective in dealing with the affairs for which they are responsible. Consequently, the performance of effective forecasting frequently requires an evaluation not only of what the operating management of a company actually will do with an estimate, but also of what action probably will be adopted by the executives of competing enterprises on the basis of their understanding of the problems which they must solve.

### COMPETITION

The efforts of competitors are infinite in number and largely uncontrollable. Competitive efforts range from cost reduction, pricing, merchandising aids and product improvement, to efficient production planning, the conduct of industrial relations, and adjustment of the form of managerial organization. Actually, there probably is no function performed in most companies which is not conducted in competition with similar functions in other enterprises. Thus, it is important to base forecasts used in managing a business on a clear understanding of the competitive relationships involved.

Despite the fact that the managerial efforts of competitors have been classified as being uncontrollable, it is to be recognized that competitive relationships sometimes are subject to a measure of control by the management of a single enterprise. If the management of one company in an industry is able to manufacture and distribute with lower costs than those incurred by competitors, the management of the efficient company may be able to establish the price at which the product will be sold. In such instances it may be assumed that the efficient enterprise has some "control" over the price of the product and, therefore, possesses some measure of control over the activities of less efficient competitors.

### NATIONAL ECONOMIC ACTIVITY

Important fluctuations in the income and expenditure of customers are reflected by similar changes in the sales and profits of businesses. This connection is easy to understand in the case of a

large corporation which sells commodities to a national market. On the other hand, small businesses which sell to a local or specialized market, also, experience changes in the demand for their products when national economic activity is either reduced or increased to an important extent. Even if a business does not sell to a national market, the incomes or purchasing power of many customers for its products are affected by fluctuations in aggregate national income, expenditure, and production. Consequently, practical business forecasting must be founded on an understanding of what kind of economic situations and what volumes of national output may be anticipated, as a result of the expectations of persons performing different economic and political functions.

### EXPECTATIONS

It is evident that all political or economic activity is the result of human action. Human action, in turn, is largely determined by the expectations held concerning the probable results or benefits derived from activity undertaken. If a potential customer does not expect to obtain satisfaction or profit from a purchase, the sale seldom is consummated. If producers do not expect to obtain profit or, in some cases, to minimize apparently inevitable losses, commodities are not created. If legislators do not expect that a law under consideration will be popular with their constituents, the legislation will not be supported. It is possible to observe situations to which the foregoing assertions may not be applied, but it seems reasonable to conclude that these exceptions are rare. Consequently, the expectations of individuals performing the functions of consumers, producers, managers, legislators, etc., are to be studied as a means of forecasting the probable volume of national economic activity, which, in turn, is indicative of the volume of sales and profits to be obtained by any given company.

### ECONOMIC ORGANIZATION

Economic activity is organized by means of our price, monetary, and legal systems, for by means of these institutions individuals are induced and enabled to devote themselves to productive effort and to exchange the commodities which they create. Consequently, it is obvious that the volume of economic activity

may be either increased or reduced as a result of changes made in these instrumentalities.

From time to time the effects of mistaken judgments, based on false expectations held by a large number of persons, create frictions and maladjustments in the economic structure and affect the level of activity experienced. Evidence of economic disorganization is found in the form of excessively optimistic or pessimistic expectations, shortages or surpluses of certain commodities or productive capacities, and laws or acts of political administration which inhibit creative activity or encourage uneconomic production. These and other circumstances may be considered as being detrimental to the efficiency with which economic effort is organized in our society.

While national economic activity may be measured in quantitative terms, expectations and organization must be dealt with in qualitative terms. The kinds of expectations and the state of organization—which can be understood but not measured in figures—determine the volume of activity which may be measured by statistics and understood in mathematical terms.

In some instances an attempt is made to ignore basic conditions in the national economy, when making sales estimates, by adopting the expedient of asking customers how much they expect to purchase of a given commodity. This procedure is supported by the general assumption that a customer knows more about his business than the supplier. A method of forecasting commonly used by adherents of this theory is to have salesmen make or collect estimates of the future requirements of their customers. A summation of these estimates, after adjustment by the central sales management, is used as a forecast in planning operations. Sometimes this procedure will be quite useful for a year or two at a time, if there is little change in the level of national economic activity.

The ideas that customers have about their future requirements should be obtained by management. This is particularly true of the requirements of customers who purchase a large proportion of the total sales of a particular product. When sales are "lumpy," the requirements of individual customers are exceedingly important.

Yet it may be observed that the majority of customers are as perplexed about the magnitude of their future requirements as

are their suppliers. Therefore, the mere fact that a customer is a customer is not to be taken as indicating that he knows what his commodity requirements will be. The magnitude of a customer's purchases depends largely on the quantity of goods which he can either sell to his trade or use, plus or minus inventory change.

It may be thought that the ultimate consumer's estimate of the quantity of goods he will purchase may be used as a definite estimate of future sales. The consumer's ideas about his preferences for a specific brand or type of goods, the price he will be willing to pay for certain products, and the kind of commodities he would like to be able to buy are to be considered seriously by producers and distributors. As a result, market surveys which measure consumer preference are useful instruments which may be employed by business management. Yet there are few consumers who know how much they will spend for commodities very many months ahead of the time when actual expenditures are made. Few consumers know exactly what they will decide about spending current income, past savings, or undertaking responsibility for debt very far in advance of the actual acts, for the emotions and expectations which influence the activities of individuals vary with changes in their economic environment. Moreover, there are few ultimate consumers who are not suppliers. Ordinarily, a consumer must find customers for the services which he must sell in order to obtain income with which to purchase the products of his own suppliers.

In our economy there is a circular flow of income. The income of a single individual or enterprise when spent or invested becomes the income of other persons and enterprises. Thus it may be demonstrated that the magnitude of customer demand for most products depends, to a large extent, on the size of the demand for the services of individuals acting as producers of services who are employed in the creation of the commodities which they buy and use.

Because of the complicated interdependence of producers and consumers, a forecast of the magnitude of future demand for a product based on customer opinion frequently is not a logical measurement of anything other than customer expectations—which may be in error.

At least three exceptions may be made to the foregoing asser-



tion. If customers estimate that their requirements for a commodity will be changed because of a change in the use or utility of the product, their opinion should carry great weight. If a customer states that he is going to make a change in his source of supply, there is reason to believe that he may do so. Finally, if a customer is equipped to make a comprehensive analysis of the many factors which determine the size of the market for his products or services, he may be able to assist his supplier in making a valid forecast of future demand.

### GOVERNMENT

A few decades ago there apparently was little tendency on the part of a majority of the population to hold the political authorities responsible for economic conditions. Then it would have been inconceivable to the representative citizen that political authorities should be allowed to establish commodity prices, determine wage rates, redistribute individual income by means of taxes, or do any of a large number of things which are within the power of government now. The factors which caused this profound change in social philosophy are beyond the scope of this book. But the fact that the political authorities now possess vast and increasing power over economic life must be understood and considered in making forecasts. Moreover, this will continue to be true as long as a majority of the electorate believe that the political authorities are responsible for employment, production, and economic conditions, in general, and that the control and management of economic affairs by political authorities will be of benefit to them.

Because government possesses the power to affect the organization of the economy, the expectations of political authorities must be taken into consideration in making practical forecasts, for their expectations will determine their policies and activities. If a recession in national output appears imminent, what will officials in the Treasury probably recommend to the President? What will be the suggestions of the Secretary of Labor? What kinds of legislation will be introduced in Congress? In general terms, what social and economic theories will be held by executives, legislators, and the judiciary; what expectations will they have, and what will they do?

It is impossible to predict in exact terms what legislators and political authorities will do in the future. Sometimes it may be observed that one government agency is acting on the assumption that a condition of deflation in the economy is just around the corner, while another political unit may be acting to prevent inflation. One group of officials may be trying to stimulate production and employment by subsidizing consumption, while another group attempts to reduce profits and succeeds, as well, in reducing the incentive to produce. In these ways different agencies, departments, and units in the government adopt policies and undertake actions which are inconsistent and contradictory.

Furthermore, there is a constant state of flux in the policies pursued by important units of the government organization over a period of time. The policies followed by one unit may reflect the theories of the policy-making officials at the head of the group. In another instance, it may be observed that the ideas of influential subordinates are adopted and used by the policy-making officials. Sometimes policies established by the political superiors of officials occupying policy-making positions in an agency or unit may be the determining factors. In addition, there is a certain amount of turnover in policy-making personnel, particularly in the executive branch of the Government, as well as frequent change in the influence of individuals in important policy-making or advisory positions.

Government economic policy must largely be considered on an all-over or abstract basis for the purposes of business forecasting. Although specific acts by legislators or executives cannot be foreseen over the long term, it is possible to understand the general nature of government economic policy and to predict, in broad terms, the probable nature of future political action in prospective economic situations. Specific political action adopted in respect to economic affairs ordinarily will be consistent with general national economic policy. And political economic policy will be formulated with the object of obtaining the support of those economic groups which wield the balance of political power on election day.

### ECONOMIC "ACCIDENTS"

These factors are termed "accidents" because they are not primarily an outcome of the dynamic development of business

activity but originate from other causes. Discoveries, certain legislation, wars, random strikes, droughts, floods, hurricanes, and other "acts of God" or events which are not generated by economic development but which do affect production and trade may be considered as being a form of accident encountered in the economic life of a nation, an industry, or a company.

Little can be done to foresee the actual time in the long-term future when the impact of accidents of this kind must be sustained by a business. Over the short term, however, it generally is possible to foresee the development of a state of affairs in which an accident, such as a drought, a war, a strike, or a specific act by the political authorities, is a probable eventuality.

Prudent managers, always aware that disturbances of this kind may arise, prepare their businesses, if possible, to withstand the shock of such factors. In practice, few forecasts are rendered useless by reason of completely unexpected accidents—so long as the estimates are made by rational observant men.

It may be noted that booms and depressions, periods of inflation or deflation, social or cultural trends, and the general activities of political authorities as influenced by these factors are not to be considered as being accidental in nature. Such matters are the normal results of the continued development of economic and social activity.

## CHAPTER IV

### THE ESTIMATE OF THE ECONOMIC SITUATION

At all times the businessman or practicing economist must know whether or not economic affairs and expectations are in such a state that an important change in the level of activity is to be expected. He must be able to recognize the existence of an unstable economic situation in which some concatenation of events may precipitate a change in the trend of activity. The management of a business must possess an "estimate of the economic situation" encompassing an understanding of the status of those economic factors which are largely outside of the control of the executives.

One important object of making an estimate of the economic situation is to determine what is the current "position" of economic affairs. This must be done before it is possible to reason about the probable future development of prices, national output, competition, government economic policy, and the sales and profits of a particular business. An adequate understanding of the position of economic affairs requires the use of the concept of economic equilibrium to provide a point of reference. When this concept is used, expectations or statistical symbols of business activity are considered to be high or low relative to an estimated level of equilibrium.\*

#### EQUILIBRIUM

If an index of industrial production, or a similar measure of national output, is charted for a period of several decades, the annual figures tend to fluctuate about a smooth curve fitted to the statistics.† This smooth curve may be considered as being

\* The equilibrium level of a mathematical series may be defined as the values about which the actual data fluctuate.

† The technique of smoothing time series, such as, sales figures and production data, is a subject which should be investigated by a person attempting to forecast business conditions. Explanations of the various techniques

representative of a level of *equilibrium*. Sometimes such a level of equilibrium is referred to as being a *normal*. Yet the use of the term "normal" in this connection implies that the level of output is one which is usually experienced. Actually, it is illogical to think that there really is a certain level of economic activity which is usual or normal. It may be observed that, in somewhat similar economic situations, there often may be found somewhat similar subsequent developments. Thus, it is logical to think of the "normal" *development* of a situation or the "normal" *results*

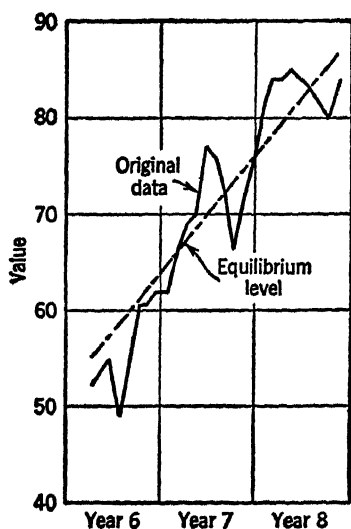


FIG. 4.1. Simple equilibrium.

to be anticipated from certain economic conditions, but it is irrational to think of a "normal" *level* of business activity.

Figure 4.1 is a diagram illustrating a level of equilibrium which might be fitted to a time series representing a monthly index of industrial production.

The idea of a level of equilibrium in economic affairs can be compared to the concept of a level of efficiency for an individual in the performance of work. When an individual is young, the daily output of labor is much smaller than that which can be produced by the same person in later years; after

the prime of life, the daily output is reduced. Thus, the daily output of labor by an individual over the long term may be represented by a curve rising during youth, attaining a maximum during the years of physical prime, and declining during later years. Such a curve may be taken as indicative of the level of equilibrium for the labor effort of an individual at any given time in his life. The actual output of energy probably seldom would be exactly the same as that indicated by the level of equilibrium.

which may be employed are to be found in almost any elementary book on the treatment of statistics. In practice, smoothed curves calculated as moving averages, or obtained by fitting curves, frequently must be adjusted on a free-hand basis. In such instances the practiced eye is more useful than the equation.

During an attack of grippe, the daily output of labor would be far below the equilibrium level or might even cease for a time. A mild cold might produce a minor decline. On the other hand, an unusually strong and temporary desire to increase earnings, or a period of exceptional health might result in a bulge in productive effort which would bring output to a level much higher than the level indicated by the long-term development of the curve of output.

Similarly, it may be observed that measures of national economic activity fluctuate about a more or less gradually changing level. Exceptionally prosperous times are periods in which production is higher than the level of equilibrium. Wars and other political developments of a major nature cause deviations. The payment of a large bonus to the veterans of a war, the occurrence of a drought, or any of many important developments may produce conditions of disequilibrium throughout the economy.

Frequently it is possible to determine two or more different levels of equilibrium which may be applied to data on national production, the output of an industry, equity prices, and other series. There may be a short-term level of equilibrium, an intermediate level, a long-term level, and variations of these. Different levels are distinguishable because of the different time periods involved.

Figure 4.2 is a diagram of the two equilibrium levels which might be isolated in the situation given. Note that the long-term equilibrium level could not be determined from the data given in the diagram. Consequently, it is to be assumed that the long-term equilibrium level has been

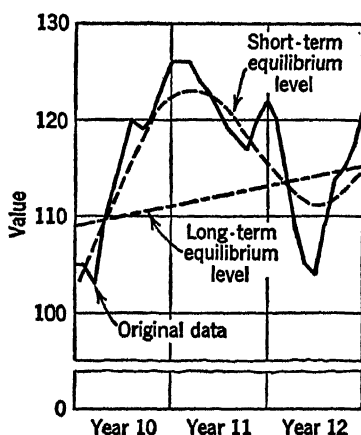


FIG. 4.2. Compound equilibrium.

determined from original data covering a longer period of time than that indicated in the figure. In the diagram the short-term equilibrium level fluctuates above and below the long-term level. The original data fluctuate above and below both equilibrium

levels. In this example there are two equilibrium levels which should be considered in forecasting the probable future development of the activity which the original data represent.

In a period when national output is above the level of equilibrium, it may be assumed that future output will be reduced to a point where it is below. Conversely, when current production is well below the level of equilibrium, it may be anticipated that conditions will be developed which will bring about a rising volume of output.

The concept of equilibrium may be applied to national production; the output of an industry; the sales of a company; the prices of commodities, services, and equities; or to the relative volumes of production in different industries. Probably a condition of true equilibrium never exists. Only disequilibria may be found in economic life. In general terms, the task of forecasting is to determine what disequilibria exist and in what manner, and at what time compensating activity probably will be effected.

### TENSION

A deviation in activity from a level of equilibrium may be taken to represent an economic *tension*\* which, barring accidents, will be increased to the point where a reaction will be precipitated when expectations are changed by events. In practice, economic activity usually is increased or reduced until some confluence of events causes a reversal of previous trends. At such turning points, the events appear to be merely disturbing influences which release the economic tensions developed during the past. Frequently the events alone are not of enough importance to cause the effects which they appear to produce. Apparently they precipitate action which would have been released by other developments if the particular events had never occurred.

### EXPECTATIONS

The expectations of persons performing different economic and political functions are an important part of the economic situa-

\*The tensions involved in the economy actually exist in the mental or emotional state of vendors, customers, managers, etc.

tion and are to be considered in relation to the kind and magnitude of tensions to be found in the economic structure at any given time. The kinds of expectations held by various persons may be learned by means of conversations, surveys, and publications. In fact, a vast fund of pertinent information concerning what different people expect in regard to economic affairs can be accumulated with comparatively little effort.

All expectations, however, are not valid in the sense that economic developments will be like those anticipated. At times, particularly before a major reversal of the trend of business activity, relatively few persons correctly anticipate the nature of coming developments in the economy. Furthermore, such persons, if sophisticated, are not inclined to air their views promiscuously. An accurate forecast of future economic developments, at a time when the cyclical course of business activity is about to be changed, generally is considered to be extremely sensational—and not the kind of opinion which should be held by a prudent and responsible person. Then, too, correct expectations are extremely valuable at critical periods in the business cycle. To warrant the right to receive a carefully developed forecast of the economic situation, it ordinarily is necessary for the recipient to make some kind of a contribution in return. Moreover, some well-informed persons are reluctant to give opinions which may cause others to sustain loss. Although willing to assume personal risks on the basis of their own opinions, they may not wish to be responsible for the loss of personal good will if their judgments are proved incorrect.

Expectations should be collected and analyzed, not to obtain an index of coming developments by striking an average of mass opinion, but to ascertain whether consumers, managers, and other persons probably will find their expectations substantiated by developments or will be obliged to change their anticipations.

The reasoning followed in dealing with expectations may be outlined by the following chain of questions:

1. What do typical persons, performing different economic and political functions, expect in the way of developments in the economy?
2. What will such persons do to adjust their affairs to the economic situation?
3. What effects will these actions have on the economy?
4. What will such persons then expect?
5. What will they do?
6. What will be the result? *Et cetera.*



By being interested in the opinions of people performing various economic functions and by observing how individuals in different positions manage their economic affairs in various situations, it is possible to understand what persons probably will do in response to the conditions which they develop in the economy.

### ANALOGY

The technique of forecasting by analogy may be most usefully employed in the development of a preliminary hypothesis concerning the future economic situation. In using this technique, an attempt is made to find general situations in the past which appear, in retrospect, to have been similar in important respects to the current or prospective situation. On the basis of the development of the past situations selected, a further development of the current situation is projected. Somewhat similar economic situations are experienced after major wars, during and after major booms in construction activity, and during periods of price inflation facilitated by an expansion in the money supply. Economic conditions during the 1870's can be compared with those which obtained in the 1930's. It is reasonable for some purposes to compare the long-term trend of prices after the War of 1812, the Civil War, World War I, and World War II. Of course, it is highly important to determine and understand the *differences* as well as the *similarities* to be found in two or more comparable economic situations when forecasting by analogy. In no two situations are all the components exactly alike; and, as a consequence, it will be found that the trend of production and prices, the kind of expectations, the type of legislation, etc., will be different in some respects. It may be concluded that, although the technique of forecasting by analogy may be employed for practical purposes, the procedure is not a substitute for observation and reason.

The superficial precision of the mathematical symbols used in economic research sometimes leads the unwary to develop forecasts based on analogy, in which the situations used as references are similar largely in that the statistics of the periods are alike. For example: The price of a bushel of wheat in 1903 and the price of a bushel of wheat in 1946 are different in respects other

than the purely mathematical differences. Qualitative differences also exist. A bushel of wheat in 1903 was of a different importance in relation to the food supply, total national output, exports, and the money supply from one in 1946. These aspects are of as much importance as are the prices for a bushel of this cereal. Between the middle '20's and the late '30's the size of the representative housing unit in this country was substantially reduced. The decrease in the size of the dwelling unit was of as much importance as was the change in the price. During the '30's the automobile industry increased the quality of the representative automobile, although prices were not changed to any considerable extent. Thus, an automobile in 1939 was a different product from that which sold for approximately the same price in 1929, and in 1939 the automobile was of different importance in the economy than was the case in 1929. In view of these and other matters, it is essential that the economist or businessman, when forecasting by analogy, should be careful not to consider economic situations to be similar when the statistics are the only factors which are alike.

In a sense, any attempt to ascertain the development of a particular economic situation by considering past experience may be considered forecasting by analogy. This technique alone is not sufficient for the purposes of business management; and, although useful if properly employed, it cannot be used as a substitute for careful competent analysis.

### PRELIMINARY HYPOTHESIS

After the current economic situation has been studied in terms of the expectations held by persons performing different economic functions, the state of economic organization, and the apparent tensions and disequilibria, it is possible to establish a preliminary hypothesis concerning probable future developments in the economy. Such a hypothesis is a complex of ideas concerning the probable trend and levels of national output, expenditure, and income; developments in important industries; the general trend of prices; probable political action; changes in the supply and use or turnover of money; and the trend and volume of profits. The various aspects of these matters are considered in

both broad or abstract, and detailed or specific terms, so that the reasonableness of the assumptions may be determined, and the ideas held may be checked with available pertinent evidence.

The importance of dealing with this kind of hypothesis in both abstract and specific terms cannot be overemphasized. Failure to follow such a procedure may lead to the formulation of fallacious judgments, as may be illustrated by an actual situation experienced in recent years.

In the 1930's it frequently was said that the continuation of government deficits would result in a depreciation of the currency. This was a statement made in highly abstract terms. Such a judgment, however, was not useful unless it could also be understood and explained in terms of a lower degree of abstraction. It should have been possible to understand what owners of bank deposits would do with their funds and how money would be exchanged for goods in such a manner that prices would have been increased. The whole detailed technical development of inflation should have been outlined. The way to reduce an abstract concept of this type to more specific terms is to ask the questions "why?" and "how?" about the matter under consideration. As a matter of fact, many intelligent people anticipated that government fiscal practice in the middle '30's would lead to a substantial depreciation in the value of our money. After crying "wolf" for several years, numerous individuals apparently became discouraged when a horrendous wolf did not appear immediately and concluded that the animal was an illusion. If such persons had been able to understand the whole technical development of price inflation, they might not have adopted either their first conclusion—as applied to the immediate future—nor have abandoned their general premise and the application of this idea to a situation in the more distant future. Actually, government deficits may cause either price inflation or deflation, depending on matters other than the deficits alone.

After a comprehensive preliminary hypothesis has been established, it may be checked and expanded by the use of statistical models of the economy (see Chapter X).

An important method of improving a preliminary hypothesis is to subject single important component concepts to critical consideration to determine the reasonableness of these assumptions relative to others employed. Problems may be stated in

the form of questions: If it is assumed that the money supply will be increased by  $x$  dollars, is it reasonable to assume that the cost of construction will be increased by  $y\%$  if the use or turnover of money is reduced by  $z\%$ ? Why? If it is assumed that government expenditure for goods and services will approximate  $s$  dollars, is it reasonable to assume that private investment will amount to  $m$  dollars? Why? If the wage rates paid by large corporations are increased by  $x\%$ , will national income approximate  $s$  dollars? Why? If the cost of living will be increased by  $b\%$ , will a buyers' strike be precipitated? Why? If federal expenditure approximates  $t$  dollars, will the money supply be increased to  $m$  dollars? Why? If the price of copper is reduced to  $p$  cents per pound, will buyers increase their position in this metal? Why?

### ESTIMATE OF THE SITUATION

After the elements of a preliminary hypothesis have been integrated, thoroughly considered, checked, and criticized, the hypothesis may be adopted and used as an "estimate of the economic situation." This comprehensive integrated complex of judgments then may be used as a conceptual basis on which to formulate forecasts for particular application to the specific problems of a business.

An "estimate of the economic situation" is a finished product at only one moment of time. Shortly after completion, it must be considered as only a preliminary hypothesis in view of the development of new evidence which can be used to check the judgments involved. Yet, in practice, properly conceived estimates of this kind sometimes may be used for long periods without being subject to important change.

## CHAPTER V

### NATIONAL OUTPUT

In discussing economic affairs, it is natural and easy to speak of "national production" and "national output." It is considerably less easy to define exactly what these words really mean; and the task of actually measuring national output is formidable.

Real national production apparently consists of the sum total of all ice cream sodas, plows, turret lathes, houses, judges' decisions, radio programs, nuts and bolts, bushels of corn, etc., produced in a given period of time. It is the aggregate of all commodities which the people of a nation want to the extent that they are willing to spend the effort required to produce them.

The task of obtaining some practicable unit which statisticians can use in the process of adding together values representing the production of wheat, steel, lectures, toothpaste, etc., is most easily solved by valuing each in terms of dollars. Yet a measurement of national output in terms of dollars leaves much to be desired, for real production is the creation of goods and services and not the manufacturing of dollars or other monetary units. Furthermore, a measurement of production in terms of dollars can vary over a period of time with no corresponding change in the volume of real production. This is due to the fact that changes in prices, as well as variations in volume, are reflected in dollar measurements of production. Consequently, the economist must consider that the available measurements of national production must be used with discrimination. Certainly the various measures should be checked against each other, so that the user may have confidence that the figures which he is employing actually bear some relationship to real production. It also should be remembered that the statistics of national output are only the symbols of real production and should be treated as such.

### STATISTICS

For the purposes of an economist who is trying to forecast business conditions, the most useful mathematical measurements of national output have the following characteristics:

1. The statistics are available for a period of one or more major cycles in economic activity. This means that the figures are measurements of activity for a period of at least 15 years.
2. The statistics are brought up to date at frequent intervals, so that the user may understand the approximate state of affairs in the recent past. In this class are monthly statistics which are reported not later than three or four weeks after the occurrence of actual events. A time lag of several weeks is no inconvenience; for, if forecasts of national output are to be most useful in planning the affairs of a corporation, the forecasts at all times should be approximately correct for a period many months in advance of the present. Sometimes it is necessary to have an adequate idea of the probable level of national production for several years in advance.
3. The statistics are commonly accepted by professional economists. Widespread acceptance permits the economist to check his original forecasts with those developed by others. Such established measurements may be thought of as terms in a specialized vocabulary by means of which individuals may communicate with each other.
4. The most useful statistics of national productive activity are reported in terms of both a total and the elements of which the aggregate is composed. An adequate understanding of the full meaning of such total figures cannot be obtained unless it is possible to analyze changes in the various relationships which exist between the component parts. In dealing with aggregates of national activity, it is necessary to understand what possible or probable changes in productive activity in certain segments of the economy will produce changes in other parts as well as in the total.

Unfortunately, it is not possible to use one simple measurement of the total result of national productive activity. There are several reasons for this. Accurate records of production and sales are not kept by a large number of producers of goods and services. Consequently, it is necessary for the statisticians who compute estimates of national activity to estimate the quantity of goods probably produced but not reported. Furthermore, there are different ideas as to what items should be included in estimates of national productive activity. In view of these and other circumstances, it is necessary to employ a number of different measures of national output in the work of forecasting future economic conditions.

### INDUSTRIAL PRODUCTION

A commonly used measure of the volume of national production is the well-known index of industrial production reported by the Federal Reserve Board. This index is intended to represent

changes in the unit volume of output in the important manufacturing and mining industries of the economy. It is to be noted that the index does not directly reflect activity in the construction industry or in agricultural production, or changes in the level of output in the distributing and service industries. To some extent these gaps in the source data on which the index of industrial production is based reduce the utility value of the index. Yet, a large proportion of national production is either derived from or dependent on manufacturing and mining. Furthermore, the volume of activity in the construction, distributing, and service industries varies directly with changes in activity in manufacturing and mining. Consequently, it will be found that the index of industrial production may be used for many purposes as a fairly accurate measure of change in the unit volume of output in the economy. When the index is used with other measures, it becomes an exceedingly useful instrument. This index is available by months since 1917. Comparable figures may be obtained back into the last century.

Because the index of industrial production is reported in terms of important component industries, it is possible to forecast the index in terms of component elements and to employ numerous current original studies in determining the probable future level of each of these. Thus, it is possible to estimate the combined effect of changes in activity in many different industries on the demand for a single product in which the economist is most interested.

### NATIONAL INCOME

When a measure of national output in terms of dollars is desired, the estimate of national income commonly is employed. This is logical, for all production is the result of human toil, either mental or physical, and the income of a nation is equal to the combined productive effort of the people at some time or other.

National income may be defined as being an estimate of the net value of marketable commodities produced. It is equal to the sum of the following components:

1. The aggregate payments to individuals and entrepreneurs for productive effort.
2. The total of corporation savings—net profits not paid out in the form of dividends.

National income is now calculated by the National Income Unit of the Bureau of Foreign and Domestic Commerce. A definition recently published by this source may be quoted as follows: "In practice this net value of product (national income) is now obtained by adding together all the incomes paid or accruing to factors of production during the given period, i.e., by aggregating all wages, salaries, dividends, net rents, net interest, entrepreneurial income, and retained earnings of business corporations."\*

By making a few adjustments to the estimate of national income, an estimate of the total income payments to individuals may be derived. This series is known as "national income payments."

The mathematical difference between the two series consists of the difference between payments made by employers into reserve funds (contributions to social security funds, etc.) and the payments made to individuals from such reserves. One other important difference is that corporation savings are not included in the income payment series but are a part of the estimates of national income.

By deducting estimates of personal tax payments from income payments, it is possible to compute an approximation of the aggregate income which may be spent or saved by income recipients. The estimate derived in this manner is known as "disposable" income and is often used to estimate changes in the aggregate demand for commodities sold to the consuming public.

An important advantage of using national income as a measure of national production is that the dollar values of the series may be related to the dollar values in the statistics of sales, money supply, wage rates, changes in the magnitude of investments, profits, etc. By using this measure of national production, it is possible to correlate changes in the financial structure of the nation with changes in national production and, thus, to estimate the effects on the demand for the products of a particular industry and a specific company. Consequently, the national income estimates and the related series are important segments of a comprehensive system of business forecasting.

\* Milton Gilbert and R. B. Bangs, "Preliminary Estimates of Gross National Product, 1929-41," *Survey of Current Business*, Department of Commerce, May 12, 1942, page 9.



## DEFLATION

When national income is used as a measure of the change occurring in the total unit volume of production, it is necessary to attempt to eliminate the effect of price variation in the original data. The original national income statistics may be divided by the values of an appropriate price index (an index of the cost of living frequently is used) and the result considered to be representative of the change which occurred in the unit volume of production. As a rough measure of variation in unit volume, the results obtained by the technique described sometimes are useful. However, a statistical series expressed in terms of dollars, which has been deflated by the use of a price index, is not an exact measurement of unit volume. When national income, or any other related dollar series, is deflated by use of a price index, the results obtained are a measure of change in respect to both quantity and quality. The deflated series may vary over a period of time owing to changes either in the volume of production or in the assortment of commodities produced. Consequently, it is generally good practice to employ the index of industrial production, rather than national income corrected for price change, as a measure of the unit volume of national output, whenever it is logical to do so.

Sometimes it will be found that deflated national income is an excellent measure of the volume of demand for a product in terms of units. In other instances the index of industrial production is more satisfactory. In part, the difference in the results obtained by using the two series may be attributed to the fact that national income is a much more comprehensive measure of national economic output than is the index of industrial production. The estimates of national income are derived from reports of income payments in the service industries, agriculture, and the construction industry, as well as income derived from production in factories and mines. Owing to the more comprehensive character of national income and because the volume of production of nondurable commodities is a more important part of total national income, this series is more sluggish or stable than the index of industrial production. The difference in the action of the two series is most apparent during periods when a major change in the business cycle is occurring. In 1933, national income rose

only 6% over the level which was obtained in 1932. In the same period of time, the index of industrial production was increased by 19%. Which of these two indexes should be used for a specific purpose is a matter that must be determined through the application of common sense by the economist employing such statistics.

In actual practice the economist should be able to use either national income in constant dollars or the index of industrial production almost interchangeably, even though at certain stages of the business cycle different relationships may exist between these two series. These differences in relationship and the probable development of such disparities should be clearly understood.

National income has been the subject of investigation for many years. Consequently, it is possible to compute an approximation of national income, comparable to the figures reported by the Department of Commerce since 1929, by using statistics developed by students of national income prior to that date.

In the work of economic forecasting conducted by the Armstrong Cork Company, both the Federal Reserve Board's index of industrial production and estimates of national income have been used by the author since 1929. Both of these series have been carried back to the year 1900 in a form comparable to the basis on which the statistics are now reported. The statistics are used as reported, and on a per capita basis, as primary measurements of national productive activity. With the use of these data, satisfactory forecasts have been made concerning the relationship of company and industry sales to national purchasing power, estimates of the probable status and development of the business cycle, estimates of economic maladjustments and disequilibria which offered opportunities for making profits, etc.

## NATIONAL EXPENDITURE

The businessman is vitally interested in knowing the magnitude of effective demand for the commodities which he wants to sell. Consequently, a practical and comprehensive system of economic forecasting should include estimates of the aggregate of national expenditure for the goods and services which are produced by business.

There are three different kinds of customers who spend money

for marketable commodities. Most of the goods and services produced are ultimately purchased by individuals who either consume or add the products to their inventories of goods. All product buying not done directly by individuals is done by agencies which represent organized groups of individuals. These purchasing agencies are enterprises, such as corporations and partnerships, and the government. Thus, consumers, businesses and government are the three sources of demand for commodities, and the aggregate of the expenditure of these groups is total national expenditure.

If the expenditures of all the purchasing units of the economy were to be added together, the sum would be of astronomical proportions which probably would not be useful except as a large statistic to be employed in making speeches about the grandeur of our economy. The useful total, however, is the aggregate net expenditure made for marketable commodities which are not purchased by individuals or agencies other than the final buyer during a given period of time. Businesses, it may be observed, buy raw materials, the services of management and labor, and capital equipment during the year, subsequently reselling all but a minor part of these things, with the exception of capital equipment. Consequently, the only expenditure made by businesses which is included in a useful total of national expenditure is the investment of capital funds by business enterprise. The aggregate of such expenditure is commonly known as "private gross capital formation." The statistics under this name also include expenditure for new construction purchased by individuals and by enterprises but not including purchases made by government. In the case of construction, it is considered that purchases represent capital investment when made by either an individual or an enterprise.

#### PRIVATE GROSS CAPITAL FORMATION

The total of private gross capital formation—or net business expenditure including investment in all privately financed new construction—consists of the sum of net change in business inventories, net exports of goods and services, net exports and monetary use of gold and silver, private expenditure for producers' equipment, and all privately financed new construction.

This item of national expenditure is an exceedingly important economic factor from the viewpoint of the economist attempting to forecast future business conditions, for it probably is not possible to have a condition of prosperity in the country unless private gross capital formation is high relative to the level of equilibrium. It may be observed that at no time during peace since the industrial revolution has the opportunity for employment been high unless private investment has been large. Nor has government expenditure for capital items been a substitute for private investment for two reasons.

1. The disposition of individuals and managers to invest capital apparently is inhibited by government investment in times of peace, although vendors may be eager to sell goods to the government any time when productive capacity is not being fully employed. Potential entrepreneurs are discouraged by either the burden of taxation or the portent of increased taxation in an economy where rates are based on ability to pay.

2. Government investment is not subject to the rigid discipline inherent in the necessity of making a profit on assets. Consequently, government investment for the purpose of expanding total national investment is subject to suspicion on the ground that assets thus acquired may represent waste and may not be additions to the national store of real wealth.

Capital formation is the material component of savings. In ordinary conversation it is customary to speak of savings as being a sum of money which an income recipient has not spent. Actually savings may be in the form of either monetary income which has been produced and neither spent nor invested, or commodities which have been produced but not consumed. There is reason to believe that much of the controversy during recent years concerning the economic effects of savings has been due to a confusion of monetary savings with real or commodity savings.

Although private gross capital formation must be high if the economy is to experience prosperity, it may be observed that immediate changes in the level of private capital formation are not pronounced at times when the tide of economic activity is changed from depression to recovery or from boom to recession. Apparently other factors in the economy are of more importance when the object is to forecast short-term changes in the level of national economic activity, but the expectations which induce a

high or low level of private capital formation are prime determinants of the level of national output over an extended period of time.

### CONSUMER EXPENDITURE

The second major component of national expenditure is the aggregate expenditure by ultimate consumers. As stated, this is ordinarily much larger than the expenditure of government and business. Only in the last war did government expenditure rise to the point where it approximated the total of consumer expenditure.

The volume of consumer expenditure depends largely on the financial resources of consumers and their disposition to spend their income and monetary savings. The willingness of consumers to spend is partly dependent on the state of their financial resources, as well as being influenced by a complex of their expectations concerning future income receipts and prices, their inventories of commodities, their judgments relative to values, and their desires. Consequently, the practicing economist not only must be well informed concerning the financial situation of consumers, the state of their inventories, and the rate at which they are buying goods, but also must use his imagination in an attempt to foresee how consumers will react to conditions which may be expected to obtain in the "estimate of the situation" which he is using.

### GOVERNMENT EXPENDITURE

The third major element in aggregate national expenditure consists of the expenditure for goods and services made by the government—federal, state, and local. Government expenditure is made for the purpose of acquiring goods and services consumed in performing functions such as education; fighting wars; policing communities; providing information; and purchasing capital assets, such as parks, monuments, highways, harbors, post-offices, arsenals, and inventories of munitions.

For various reasons government spending has become a more important part of national expenditure since the First World War. Furthermore, it may be anticipated that a large part of aggregate national output will be purchased by political authorities in the future. As a result, the practicing economist must be well informed

concerning the policies which will be practiced in regard to government spending in the future and must have a well-developed and realistic idea of how government practices will affect private gross capital formation and consumer expenditure.

When estimates of private gross capital formation and government and consumer spending are added, a total estimate of national expenditure is obtained. It is to be assumed that a figure obtained in this way will represent the market value of all commodities sold in the economy. An official definition of the estimate of national expenditure (also called "gross national product") may be quoted as follows: "The concept of gross national product . . . is designed to count all final products and services produced by the economy at the prices these products command in the market."\*

The market prices of commodities include charges for depreciation, depletion, and gross profits. Of the gross profit obtained by incorporated business, the government takes a part by means of the tax on profits, which is euphemistically called the corporate income tax. In addition, certain property and other taxes are paid by businesses and charged to customers in the prices of the products purchased from the tax-paying businesses. It is evident, therefore, that the prices of the goods purchased by the government include charges for taxes collected by the government. Furthermore, businesses charge for the wear and obsolescence of capital equipment by means of depreciation charges which are a component of the market price of most products. Thus, commodities purchased by consumers and the government are sold at prices which include charges for various taxes, depreciation, depletion, obsolescence, and certain other costs. Consequently, it may be seen that the statistics of total national expenditure are an estimate of the value of current production, plus charges made by businesses for depreciation, etc., and for funds which are turned over to the various units of government. As a result, it may be concluded that, although the estimate of national expenditure or gross national product is useful for some purposes, the estimate of national income is a better measure of the value of current national output. Estimates of national income are neither subject to fluctuations resulting from changes in the rate at which the profits of business are taxed, nor do they

\* *Ibid.*, page 41.

contain charges for the consumption of capital items produced in past periods.

Like the index of industrial production and the estimate of national income, the estimate of national expenditure is reported in terms of its component parts. In addition, several different breakdowns are available which greatly increase the utility of this series. This is the only measure of national expenditure in which investment expenditure is differentiated from consumption expenditure and in which the magnitude of government expenditure may be compared with the volume of private expenditure for consumption and investment.

In using the gross national product estimates, it is extremely important to bear in mind that changes in the figures are caused by the decisions made by human beings in the process of making and administering laws, managing businesses, buying toothpaste, investing money, or taking a vacation. Too often it may be observed that someone has juggled the astronomical statistics of gross national product and conclusively proved how national prosperity can be attained by merely changing a few figures. In such economic studies the symbols of effects are treated as being casual factors. Much of the garden variety economic theory supporting the expenditure of public funds as a means of attaining national prosperity is based on such misconceptions.

In the planning done by the Armstrong Cork Company, estimated changes in national expenditure are related to estimated changes in both national income and the index of industrial production. By this means it is possible to convert an estimate of national expenditure into an estimate expressed in terms of the Federal Reserve Board's index of industrial production, or national income, or vice versa.

Because of the usefulness and importance of the statistics of national productive activity, it is desirable to possess a means by which these data can be organized and handled to the best advantage. In Chapter VII will be described the system now employed in the Armstrong Cork Company.

## CHAPTER VI

### THE MONEY WE USE

In business life all goods and services bear visible or invisible price tags. Prices are quantities of money. In fact, almost every effort employed in producing salable goods or services is measurable in terms of dollars, and people calculate their economic debts, savings, and income in monetary units. Consequently it is natural that important changes in the monetary structure and in the quality and quantity of money may have very important effects on both the price and volume of goods and services produced.

Money is a fascinating, intricate, and highly abstract subject about which many theories have been developed. Turnover in the acceptance of monetary theory has been quite high in the past. A theory would be accepted by the current social leadership for a time—only to be supplanted by a newer and more stylish concept later on. Apparently it is to be suspected that the general acceptance of monetary theory is a matter largely determined by what individuals wish to believe, the apparent requirements of the time being answered by the acceptance of ideas which seem to satisfy current needs. This peculiarity of economic society is not limited to an eclectic acceptance of ideas about money. Almost any variety of economic truth can be adopted by social leadership if the apparent truth seems to be adapted to the assumed needs of the times.

### QUANTUM THEORY

In the United States, prior to the depression of the 1930's, most sophisticated economists apparently subscribed to the quantity of money theory in one or another of its forms. Baldly stated, this concept was that prices are directly affected by the quantity of money existing and that changes in the quantity of money would produce changes in prices. If the supply of money should be expanded and the production of goods were not increased, it



would be expected that the price level would rise. In later years, when this theory was commonly accepted, the idea was developed that the velocity with which currency "circulated" was a factor of importance in determining the level of prices. It was assumed that an increase in the velocity of circulation would have the same effect as an expansion of the money supply, because each monetary unit would do more "work" if it were circulated from hand to hand more rapidly.

### VELOCITY OF CIRCULATION

Unfortunately, it is impossible to obtain a direct measurement of the velocity with which money circulates in the economy, although attempts have been made to measure the velocity or turnover of bank deposits by dividing debits by deposits. The results thus obtained have not been very useful.

A large number of debits are caused by transfers of money which do not directly affect either commodity prices or production. In this class of transaction is the exchange of bank deposits for securities. When deposits are moved from one location to another, debits also are registered without an effect on commodity prices. The influence of speculative activity on the velocity measure—obtained by dividing debits by deposits—was realized by statisticians, and an attempt was made to eliminate the effect of speculation from the ratio by deducting the statistics of financial activity in New York and Chicago. By this means all the business transactions effected in the two largest cities of the country were eliminated, and all the effects of speculation, involving payment by check in the rest of the country, were retained. Yet it is logical to presume that there are many persons who speculate in securities, even though they do not happen to bank in New York or Chicago. For this and other reasons, the various attempts to measure the velocity of circulation failed to yield significant results. Worst of all, the velocity figures failed to substantiate the quantity of money theory.

The idea that money circulates with more velocity at one time than another is worth consideration. It is possible to understand why money would change hands more rapidly when a catastrophic rising spiral of prices is underway. Then days or even hours count in exchanging currency for goods. Yet it is extremely

difficult to comprehend how money can circulate more rapidly at one time than another in the more normal situations experienced in an economy. Income recipients receive their wages, salaries, pensions, and dividends at reasonably regular intervals. The money thus received is spent over a period of time which is of about the same duration after each income payment. Consequently, it is extremely difficult for an individual to comprehend how he can increase the speed with which he spends his income in a manner which will affect the price of commodities.

Ordinarily the factor which can be determined by the individual in regard to his income is whether or not he will spend all of the money which he obtains. Thus, it is possible that individuals may exert an influence on prices by deciding whether or not to spend or invest current and past savings. In modern times a demand deposit, representing savings, is of little if any importance in determining the level of commodity prices until the owner exchanges the deposit for commodities either directly or indirectly. Even if such a deposit is used to buy commodities, it is possible that someone else may decide to save an equal quantity of money in the form of a demand deposit and thus provide an offset to the first expenditure. If the expenditure or investment of one person is counterbalanced by the savings of a second person, it is apparent that the net demand for commodities would not be affected by the transactions. It may be concluded that, although there is little foundation for the idea that ordinarily there is a change in the velocity with which money circulates from hand to hand, there is real reason to think that the willingness of people to use money which they possess does have an important effect on the price level.

Despite the fact that the ratio of bank debits to deposits is not a satisfactory measurement of changes in the use of money by owners of funds, and even though it has been demonstrated that the effect on prices of an increase in the supply of money may be offset by a simultaneous rise in monetary savings, it is premature and illogical to assume that a change in the magnitude of the money supply will not affect the level of prices under all conditions. Consequently, it will be found useful to use an objective measurement of the relationship existing between the dollar value of national production and the money supply.

## MONEY SUPPLY

The money supply may be defined as the aggregate of bank deposits and currency in circulation. Several series, however, can be computed on the basis of this general definition. Two such possible series have been found most useful and are described in the following paragraphs.

The first of these series is a measure of the total amount of deposits and currency which owners probably would consider to be liquid funds readily available for the purposes of investment or consumption. The liquid money supply is composed of the total of demand deposits, adjusted deposits of the United States Government, time deposits with the commercial banks, and currency outside of banks. Time deposits with mutual savings banks and the postal savings system are not included, because these are more like equities than liquid sums of money. In a very real sense, the savings banks are investment trusts. The time deposits of commercial banks are considered as being liquid funds, because the owners actually draw on such reserves during periods of depression by converting time deposits to demand deposits. The figures used in making this series are reported each month in the *Federal Reserve Bulletin* in the table entitled, "Deposits and Currency—Adjusted Deposits of all Banks and Currency Outside Banks." The statistics reported for the end of 1944 are given as follows:

LIQUID MONEY SUPPLY, DECEMBER 30, 1944  
Millions of Dollars

1. Demand deposits (adjusted)	66,930
2. United States Government deposits	20,763
3. Time deposits; commercial banks	24,074
4. Currency outside banks	23,505
Total	<u>135,272</u>

The second of the series, representing the money supply, includes deposits in savings banks. This is a more comprehensive measure than the first series and is used because it is possible to account for changes in the total by analyzing the sources of such money. These figures also are reported in the table mentioned in the foregoing paragraph.

TOTAL MONEY SUPPLY, DECEMBER 30, 1944  
Millions of Dollars

1. Liquid money supply	135,272
2. Time deposits, mutual savings banks	13,376
3. Time deposits, postal savings system	2,340
Total	<u>150,988</u>

Both these series rise and fall together. This is due to the fact that the total of savings deposits, which is the mathematical difference between the two series, is relatively stable and does not change much from year to year. Consequently, it is possible to calculate changes in the supply of liquid money from estimates of changes in the total supply which may be analyzed to better advantage.

INDICATED USE OF MONEY

The relation of the liquid money supply to the dollar value of national output may be determined by dividing the estimate of national income by the money supply. The result may be considered to be a measurement of change in the use of money in productive activity. It is to be granted that the measurement leaves much to be desired; yet over a long period of time this ratio has risen during periods of rising economic activity and declined during periods of recession. Such movements would be expected in a measure of changes in the general level of confidence; for, when individuals and managers are willing to spend and invest funds, productive activity and prices rise. Conversely, when the owners of funds decide to maintain or accumulate sums of money, economic activity and prices decline. In view of the fact that the ratio of the liquid money supply to national income actually has varied in a manner similar to that which would be expected of an index of consumer and investor confidence, the ratio can be used as a measure of the "use of money" in forecasting.

One important characteristic of the ratio should be observed. For several decades the ratio has been declining. A number of factors may be offered as reasons why this should be. The progressive rationalization of business in which the operations of enterprises have been expanded to include the distribution function—or even the production of raw materials—may be one

cause. There is reason to believe that businesses have tended to carry larger cash balances with the passage of time. Certainly this is true of the government. Possibly, also, the effect of progressive tax rates, which have reduced the opportunity of keeping income derived from investment, has been to discourage investment with the result that many persons have let funds accumulate in idle cash balances. In any case, it is a fact that over the long term national income has been less and less relative to the supply of liquid money.

When the ratio of the liquid money supply to national income is employed for analytical purposes, the secular or long-term trend of the relationship should be considered. This trend can be used as an indication of the level of equilibrium of the ratio. It may be anticipated, when managers, investors, and income recipients either have optimistic expectations or expect prices to rise substantially, that the ratio will rise to a point above the level of equilibrium. The simultaneous rise in national income would be due to either an increase in prices or the volume of output or a change in both of these components.

Since the 1920's there has been much less discussion and interest in the quantity-of-money theory with a few notable exceptions, such as, the Act of May 12, 1933. In this legislation the President was authorized to direct the Secretary of the Treasury to issue currency in the form of United States notes to the amount of \$3 billion. The purported purpose of the Act was to expand the money supply and thus raise prices to engender an optimistic feeling in the populace. Then, too, there have been a number of pronouncements that the devaluation of gold and the crescendo of federal deficits would bring about price inflation. So, it is evident that the quantum theory has not been entirely ignored.

In the '30's the majority of articulate economists who were heeded by statesmen, the public, and the intelligentsia, were mainly interested in the theories so ably expounded by John Maynard Keynes. The student and practitioner of Keynesian economics firmly focused attention on the assumed relation of aggregate national savings to the total of national investment and, with this frame of reference, proceeded to take whatever action seemed to be necessary to balance estimated savings and investment. Thus, balanced national budgets became relatively unimportant; the national debt became a mere bagatelle, because

the people owed it to themselves; and thrift was considered to be a national evil. The nonprosperous condition of the country in the '30's was attributed largely to a lack of money in the hands of persons who would spend funds and too large an amount of national income flowing to individuals and enterprises who would save more than they were believed to spend for investment and consumption. Because of preoccupation with the problems of redistributing the flow of income and finding means whereby funds could be obtained by public authorities to prime the pump of national spending, the effect of an expansion of the money supply was dismissed as not being of much importance.

In the '30's the major national economic problem was considered to be how to prevent deflation rather than how to protect the economy against an inflation which might develop at some indefinite time in the future. Whenever someone mentioned that continued government deficits had the effect of expanding the money supply, it was customary to point out that while the money supply was being increased, the turnover was being reduced and that commodity prices were not rising as would have been the case if the money supply were a determining factor. By the beginning of the war, the Nation seemingly had become quite apathetic to the potential dangers of price inflation as a result of government deficits.

#### WARTIME FINANCE

With the outbreak of war, the federal deficits were increased. As the war progressed, the deficits rose until the budgetary deficit in the fiscal year 1943 amounted to almost \$56 billion, which is approximately equal to total national income in the year 1935.

The stated objective of the political administration was to finance one half of the wartime federal expenditures by means of taxation and the other half by borrowing. In no year were federal tax receipts actually as large as the deficit. Thus, from June 30, 1940, to June 30, 1945, the public debt outstanding was increased by \$210,619,000,000; and, from then on, the existence of these obligations became an item which must be considered by the economist interested in forecasting future economic conditions, for the way in which the public debt is handled probably will have extremely important effects on the volume of national output and the prices at which commodities are exchanged. In

this connection, it is to be recognized that government securities are monetary media and presumably can be exchanged for bank deposits or currency at the will of the owner. Such exchanges have important effects on the national financial structure and, in particular, on the operations of the Federal Reserve Banks.

With the passage of the Federal Reserve Act on December 23, 1913, it became possible to expand the money supply of the country on the basis of evidence of debt placed with the reserve banks to increase the reserves of the member banks. Furthermore, the reserve banks could increase the reserves of member banks by buying government and certain other obligations on the open market. By these means the reserve banks were enabled to provide an elastic and flexible currency for the Nation. Among other benefits of the new bank system, a boom in business activity would not necessarily come to an end owing to a lack of money. This is to say that the end would not come until the Federal Reserve Board (now called the Board of Governors of the Federal Reserve System) would care, or be forced, to risk the wrath of the Nation by raising interest rates or changing reserve requirements at a time when such action would deflate a very pleasant inflationary national "binge."

But the full potentialities of the Federal Reserve System were not realized until the advent of World War II. Largely because it was not politically possible to induce the populace to pay for the war while they were fighting it, it was necessary to place \$61 billion of federal obligations with the commercial banks during the five-year period ending on June 30, 1945. During the same period securities totaling \$19.3 billion were purchased by the Federal Reserve Banks for the purpose of increasing the reserves of member banks so that they could buy bonds. The government securities bought by the commercial banks were paid for by simply creating deposits in favor of the government. In this way an amount of money approximately equivalent to the value of the bonds bought by the commercial and reserve banks was brought into existence, and public debt was thus used as a base on which the money supply of the Nation was expanded.

The end of the war did not end the expansion of the national total of bank deposits and currency, owing to federal deficits during the war years. Individuals, corporations, and personal trusts purchased in the neighborhood of \$85 billion or more of

federal obligations during the five years ending June 30, 1945. Probably a substantial part of the total public debt will remain as permanent liquid savings held by owners other than the banks and insurance companies. Yet some important proportion of the privately held debt presumably will be converted into bank deposits when businessmen experience a need for funds to finance inventories, accounts receivable, and additions to fixed assets. Individuals also probably will liquidate bonds to obtain money to use in buying residences, automobiles, and other commodities. When the owners of these bonds liquidate, it seems probable that the government will be obliged to issue new obligations to be sold largely to the commercial banking system in order to obtain funds with which to redeem the wartime issues. A substantial part of the marketable issues held by manufacturing and commercial enterprise presumably will be purchased by the banks in the open market. Consequently, it is reasonable to assume that the money supply will be increased substantially in the years to come.

In view of these matters, it will be extremely important to know how the federal authorities will manage the debt, to know what they may be obliged to do, to know what kind of owner is holding government obligations and in approximately what quantity, to know what owners of government securities probably will do with their holdings in view of changes in their requirements and expectations. By having such information, it will be possible to develop conclusions concerning the magnitude of the future money supply and what effect the large supply of liquid funds may have on the volume and price of national output.



## CHAPTER VII

### ORGANIZATION OF STATISTICAL DATA\*

The practicing economist uses many statistical series which represent measurements of national economic activity. The maximum benefit from possessing such information can be obtained only when the details are organized so that original and other estimates of different phases of economic activity may be inter-related and compared. Furthermore, it is essential that statistical information be organized in a system which may be maintained as a matter of routine. By means of such a system the time of the economist is not absorbed either by searching for data which should be available at all times or by the labor involved in keeping statistical records.

In this chapter is outlined a system of tables by means of which measurements of national economic activity are maintained in the office of the economist of the Armstrong Cork Company for use in forecasting sales, profits, the prices of raw materials, and other factors of importance in company planning. It may be noted that little of the statistical material dealt with is originated in the company. Most of the tables are either a complete or partial adaptation of standard reports, or special studies, which have been made by statisticians and economists engaged in research work. If there is anything unique in the methods outlined, it is in the way in which the data described are organized and used.

On the following pages 12 standardized tables are outlined. In these tables data covering past experience and estimates of probable future developments are maintained on a routine basis. Current data and revisions of past data are entered whenever available. Estimates which are published by different individuals or research organizations are recorded here. Original estimates

\* The casual reader is advised to skip this chapter, in which details of technique employed in handling the statistics of national activity are described.

made in the Economist's Office are entered on these tables and are available for use at any time.

The tables outlined in this chapter, with some exceptions, consist merely of listings of the titles of important statistical series and the estimates which represent projections of such figures. In the actual records maintained, past and current data and estimates are available for each of the titles given. In some instances the titles in the tables are followed by the word "detail" in parentheses. This is to indicate that in actual practice the details of the subject are treated more thoroughly than is indicated by the title alone. Actually, of course, many of the estimates needed to fill in these tables result from special studies which are not indicated. Whether or not such special research is necessary or possible is a matter which varies from time to time according to the status of the business cycle, the nature of information available, and other factors.

A further description is afforded by an inspection of the tables themselves and the sources of data which are given for each.

### TABLE I

#### NATIONAL INCOME BY DISTRIBUTIVE SHARES

- I. Total compensation of employees
  - A. Salaries and wages
    - 1. Salaries and wages in private industry.  
*Detail:* Payments by major industries and subdivisions of industries.
    - 2. Salaries and wages in government agencies.
  - B. Supplements to salaries and wages.  
*Detail:* Work relief wages, social security contributions of employers, employer contributions to pension funds, compensation for industrial injuries.
- II. Net income of incorporated business
  - A. Dividends.
  - B. Corporate savings.  
*Note:* In estimating corporate net income, it is necessary to estimate net income before taxes and then deduct federal taxes.
- III. Net income of proprietors
  - A. Agriculture.
  - B. Other entrepreneurial income.
- IV. Interest
  - A. Federal interest payments.
  - B. Other.
- V. Net rents and royalties.

*Sources of data:*

1. Data for past periods: Various published studies of the National Industrial Conference Board, the Department of Commerce, the National Bureau of Economic Research, and the *Treasury Bulletin*.
2. Forecasts and current data: *Survey of Current Business*, *Treasury Bulletin*, various published and unpublished studies, original forecasts.

TABLE II

## NATIONAL INCOME PRODUCED IN INDUSTRIAL DIVISIONS

- I. Industries producing goods
  - A. Agriculture.
  - B. Mining (detail).
  - C. Manufacturing (detail).
- II. Contract construction.
- III. Distributing industries
  - A. Transportation.
  - B. Trade.
- IV. Service industries
  - A. Power and gas.
  - B. Communication.
  - C. Finance.
  - D. Personal, business, and professional.
- V. Government
  - A. Federal.
  - B. State and local.
- VI. Miscellaneous.

*Sources of data:*

1. Data for past periods: Same as national income by distributive shares.
2. Forecasts and current data: Same as national income by distributive shares.

TABLE III

## DISPOSITION OF NATIONAL INCOME

- I. National income:
 

*Add:* Transfer payments (Table V, item III),  
*Less:* Corporate savings (Table I, II-B),  
       Contributions to social insurance funds (Table IV, item III).

*Equals:*
- II. Income payments to individuals (and unincorporated businesses),
 

*Less:* Personal taxes and nontax payments (Table IV, items I-B and II-B),

*Equals:*
- III. Disposable income of individuals,
 

*Less:* Consumer expenditures (Table VIII),

*Equals:*

**IV. Apparent monetary savings of individuals.**

*Note:* This item is a residual which is obtained by subtracting estimates of national aggregates from estimates of other national aggregates. Because the figures are obtained in this manner, they should be used with reservations.

*Sources of data:*

1. Data for past periods: Various studies published by the Department of Commerce. The estimates of savings can be checked with the estimates made by the Securities and Exchange Commission, Philadelphia, entitled "Volume and Composition of Individual's Savings." These studies are issued quarterly. It is to be noted the SEC studies are based on somewhat different definitions from those employed by the Department of Commerce.
2. Current data and forecasts: *Survey of Current Business*, Securities and Exchange Commission quarterly estimates of individual's savings, various published and unpublished studies, and original forecasts derived from estimates made on other tables.

**TABLE IV****GOVERNMENT RECEIPTS****I. Federal receipts****A. Federal budget receipts.**

*Detail:* Income and profit taxes; estate, gift, and capital stock taxes; other internal revenue; employment taxes, customs; nontax receipts.  
*Less:* Appropriations to old age account to obtain net budget receipts.

**B. Federal tax and nontax series.**

*Detail:* Deduction from budget receipts of employment taxes, capital transactions. Addition of excess of business tax liabilities over collections and excess of personal tax payments over budget receipts. By this means the total tax liability and payments of individuals and corporations are adjusted to the income concepts on which the national income estimates are based. The total obtained is then broken into business tax and nontax liabilities, and personal tax and nontax payments.

**II. State and local government receipts****A. State and local budget receipts.**

*Detail:* Sales taxes, licenses, individual income taxes, estate and gift taxes, corporation income taxes, miscellaneous taxes, nontax receipts, and property taxes.

**B. State and local tax and nontax series.**

*Detail:* Deduction from budget receipts of the excess of business tax liabilities over collections and the breakdown of the total result to obtain business tax and nontax liabilities, and personal tax and nontax payments.

**III. Derivation of contribution to social insurance fund series.**

*Detail:* Employment taxes in federal budget, other employment taxes

and government contributions to government employee retirement funds.

*Sources of data:*

1. Complete detail of table: Milton Gilbert and George Jaszi, *Survey of Current Business*, April 1944, page 10.
2. Current data and forecasts: *Survey of Current Business*, *Treasury Bulletin*, various published and unpublished studies, original forecasts.

TABLE V

GOVERNMENT EXPENDITURE

- I. Federal expenditure
  - A. Federal budgetary expenditure.  
*Detail:* Interest on public debt, Social Security program, Veterans' Administration, aid to agriculture, public works, relief, departmental, and other.
  - B. Federal expenditure for goods and services.  
*Detail:* Deductions from budgetary expenditure of capital transactions, refunds of taxes, relief, pensions, transfers to trust accounts, etc., and addition of payments to government employee retirement fund, etc.
- II. State and local government expenditure.  
*Detail:* Budgetary expenditure less payments for relief.
- III. Derivation of transfer payments.  
*Detail:* Pensions and relief included in budget, payments from social insurance funds.

*Sources of data:*

1. Complete detail of table: Milton Gilbert and George Jaszi, *Survey of Current Business*, April 1944, page 9.
2. Current data and forecasts: *Survey of Current Business*, *Treasury Bulletin*, various published and unpublished studies, original forecasts.

TABLE VI

PRIVATE GROSS CAPITAL FORMATION

- I. Private expenditure for new construction
  - A. Residential.
  - B. Industrial.
  - C. Commercial.
  - D. Institutional.
  - E. Farm.
  - F. Public utility.
- II. Private expenditure for producers' equipment.  
(Details for types of equipment for which dollar sales and/or orders are reported.)

- III. Net change in business inventories.
- IV. Net exports of goods and services.
- V. Net exports and monetary use of gold and silver.

*Sources of data:*

- 1. Data for past periods: Various studies published by the Department of Commerce.
- 2. Current data and forecasts: *Survey of Current Business*, *Treasury Bulletin*, various published and unpublished studies, original forecasts.

## TABLE VII

### CONSUMER EXPENDITURE

- I. Expenditure for goods: These figures, now reported quarterly, should be correlated with the monthly sales reported for all retail stores. The sales for all retail stores may be detailed as follows:
  - A. Sales of stores selling durable goods.  
*Detail:* Automotive group, building materials and hardware, home furnishings, jewelry.
  - B. Sales of stores selling nondurable goods.  
*Detail:* Apparel, drugs, restaurants, food, filling stations, general merchandise, other retail stores.
- II. Expenditures for services and gifts.  
*Note:* A different type of detail has been reported by the Department of Commerce. The one indicated here is more useful for the purposes of forecasting business conditions.

*Sources of data:*

- 1. Data for past periods: Statistics reported by the Department of Commerce.
- 2. Current data and forecasts: *Survey of Current Business*, original forecasts.

## TABLE VIII

### GROSS NATIONAL EXPENDITURE

- I. Gross national expenditure—components classified by use of product
  - A. Consumer expenditure (Table VII).
  - B. Private gross capital formation (Table VI).
  - C. Government expenditure (Table V).
- II. Gross national expenditure—relation to national income
  - A. National income (Table I),  
*Plus:*
    - 1. Business tax and nontax liabilities (Table I, item B, and Table IV).
    - 2. Depreciation and depletion charges.
    - 3. Other business reserves.
    - 4. Capital outlay charged to current expense.

5. Adjustment for inventory revaluation.

6. Adjustment for discrepancies.

*Equals:*

B. Gross national expenditure.

*Sources of data:*

1. Data for past periods and description of items 2 to 6 in item II, see article entitled "Preliminary Estimates of Gross National Product, 1929-41" by Milton Gilbert and R. B. Bangs, *Survey of Current Business*, May 1942, page 9.
2. Current data and forecasts: *Survey of Current Business*, various published and unpublished studies, original estimates.

The maximum benefit from the statistics concerning the money supply cannot be obtained without an understanding of the derivation of money and how the sources of money will be developed in the future. To this end it is necessary to be conversant with the factors in the banking and monetary systems by means of which the money supply is increased or reduced.

There are a number of techniques which may be employed to handle the statistics involved in recording and following changes in the sources of money. Over a period of time a number of different methods have been used in the forecasting work done by the Armstrong Cork Company. The methods now followed were designed to obtain an approximate measurement of current and prospective changes in the sources of money rather than to develop the completely accurate figures which could be calculated by employing a more laborious process.

A simplified system of accounting for changes in the money supply is outlined in Table IX. This system was designed so that no statistics other than those obtainable from current publications are required. Because of this feature, it is possible to follow developments affecting the supply of money without requesting special information from the Reserve Bank authorities.

The technique employed in establishing the system is an adaptation of the methods used by J. Brooke Willis in an unpublished study entitled, "The Derivation of Factors Causing Change in the Deposits of All Active Banks." This study was made while Willis was a member of the department of financial and business research of the Chase National Bank.

It is to be noted that the money supply accounted for (Table IX, item III) is different from the total money supply (see

page 53). In part this discrepancy is due to the fact that the figures for the sources of money do not include the uncollected items of all banks. In addition, there are several discrepancies which result from using short-cut methods in the calculations. The task of eliminating these discrepancies involves more work than is justified by the results obtained for the purposes to which such estimates generally are put.

It is apparent that major changes in the supply of money result from variation in the following items listed in Table IX: Loans and discounts of all banks, bank investment and government obligations, Reserve Bank credit outstanding, and the monetized gold stock. Other factors, although sometimes of importance, either are not so large or are relatively stable over a period of time. Consequently, a forecast of the future status of the money supply involves estimating what changes may be expected to obtain in the four major sources of money.

Original forecasts of change in the volume of loans and discounts and the monetized gold stock may be made on the basis of analogy and judgments of what to expect in view of the "estimate of the economic situation" being used.

The development of a forecast of probable changes in bank holdings of government obligations and in the volume of Reserve Bank credit outstanding requires a statistical analysis of both the federal fiscal situation and the ownership of the public debt. In Tables X, XI, and XII are organized the statistics covering federal financing, ownership of public debt, and the important factors which determine changes in the money supply.

From estimates of the prospective receipts and expenditures of the Federal Government, a forecast of the probable deficit or surplus is obtained. This figure is entered as the first item in Table X. Other reasonable estimates are entered in the rest of the table to obtain an approximation of the probable change in the public debt.

The estimated change in the public debt is carried to Table XII and entered as the first item. The next step is to estimate what changes may be expected in the holdings of government obligations by different classes of owners. These forecasts are based on judgments relative to what owners of government obligations logically may be expected to do with their securities in view of the "estimate of the economic situation" being used.



In this way trial estimates may be obtained concerning probable future changes in the magnitude of the investments of all active banks and the total of all Federal Reserve Bank credit outstanding. These items are carried to Table XII.

In Table XII are summarized the factors of major importance in determining the future supply of money. These figures may be used in estimating the general trend of prices by using a technique to be described in another chapter.

**TABLE IX**  
**DERIVATION OF THE MONEY SUPPLY**  
Millions of Dollars

		<i>December 30, 1944</i>	<i>Source of Data</i>
<b>I. Sources of Money</b>			
A. All active banks (except Reserve Banks)		121,199	
1. Loans and discounts	26,102		CC
2. Investments	94,011		CC
(a) Government obligations	86,415		CC
(b) Other investments	7,596		CC
3. Miscellaneous bank items	1,086		ST "A"
B. Reduced Reserve Bank credit outstanding		19,821	FRB
C. Monetized gold stock		18,498	ST "B"
D. Monetized silver and minor coin		2,976	ST "C"
E. Other Treasury currency		900	ST "D"
Total		163,394	
<b>II. Offsets (Deduct)</b>			
A. All active banks (except Reserve Banks)		10,893	
1. Capital funds	9,046		CC
2. Currency and coin	1,801		CC
3. Bills payable	46		ST "E"
B. Reserve Bank items		2,440	FRB
1. Foreign deposits	1,204		
2. United States Treasury deposits	440		
3. "Other" deposits	394		
4. Other Federal Reserve accounts	402		
Total		13,333	
III. Money accounted for		150,061	
A. Adjustment factor		927	
Total		150,988	
IV. Total money supply		150,988	(page 53)

*Sources and keys:*

- CC Report of the Comptroller of the Currency, "Assets and Liabilities of all Active Banks in the United States and Possessions"
- FRB *Federal Reserve Bulletin*, tables entitled, "Member Bank Reserves, Reserve Bank Credit, and Related Items," "Principal Assets and Liabilities of all Federal Reserve Banks"
- ST Subsidiary Tables A, B, C, D, or E
- USM *Federal Reserve Bulletin*, Table "United States Money, Outstanding and in Circulation, By Kinds"

## TABLE IX

## SUBSIDIARY TABLE A

## MISCELLANEOUS BANK ITEMS—DECEMBER 30, 1944

	<i>Thousands of Dollars</i>	<i>Source of Data</i>
1. Bills payable and rediscounts	125,624	CC
2. Bank premises, etc.	1,066,158	CC
3. Real estate other than bank premises	167,648	CC
4. Investments and other assets indirectly representing bank premises or other real estate	86,172	CC
5. Customers' liability on acceptances outstanding	67,924	CC
6. Interest, commissions, etc., accrued but not collected	260,972	CC
7. Other assets	208,550	CC
<i>Less:</i>		
8. Acceptances executed by or for account of reporting banks	78,146	CC
9. Interest, discount, etc., collected but not earned	47,514	CC
10. Interest, taxes, etc., accrued but not paid	293,540	CC
11. Other liabilities	398,420	CC
12. Discounts and advances of Reserve Banks	79,825	FRB
Total	1,085,603	

## TABLE IX

## SUBSIDIARY TABLE B

## MONETIZED GOLD STOCK—DECEMBER 31, 1944

	<i>Thousands of Dollars</i>	<i>Source of Data</i>
1. Gold: Total outstanding	20,619	USM
<i>Less:</i>		
2. Gold: Held in Treasury cash	2,121	USM
<i>Equals:</i>		
3. Gold: Monetized	18,498	USM

TABLE IX  
SUBSIDIARY TABLE C

MONETIZED SILVER AND MINOR COIN—DECEMBER 31, 1944

	<i>Thousands of Dollars</i>			<i>Source of Data</i>
	<i>A</i>	<i>minus B</i>	<i>equals C</i>	
	<i>Total Out-standing</i>	<i>Money in Treasury Cash</i>	<i>Supply</i>	
1. Standard silver dollars	494	95	399	USM
2. Silver bullion	1,520	..	1,520	USM
3. Subsidiary silver coin	784	13	771	USM
4. Minor coin	292	6	286	USM
Total			2,976	

TABLE IX  
SUBSIDIARY TABLE D

OTHER TREASURY CURRENCY—DECEMBER 31, 1944

	<i>Thousands of Dollars</i>			<i>Source of Data</i>
	<i>A</i>	<i>minus B</i>	<i>equals C</i>	
	<i>Total Out-standing</i>	<i>Money in Treasury Cash</i>	<i>Supply</i>	
1. United States notes	347	3	344	USM
2. Federal Reserve Bank notes	570	1	569	USM
3. National Bank notes	124	..	124	USM
4. Federal Reserve notes	..	137	(137)	USM
Total			900	

TABLE IX  
SUBSIDIARY TABLE E

BILLS PAYABLE AND REDISCOUNTS  
OF ALL ACTIVE BANKS—DECEMBER 30, 1944

	<i>Thousands of Dollars</i>	<i>Source of Data</i>
1. Bills payable and rediscounts, etc.	125,624	CC
Less:		
2. Rediscounts at Federal Reserve Banks	79,825	FRB
Total	45,799	

TABLE X  
FEDERAL FINANCING OF CASH REQUIREMENTS—

CALENDAR YEARS

Millions of Dollars

	<i>Assumption</i>
1. Budgetary deficit	86,600
2. Net change in general fund balance	(5,800)
3. Net change in trust accounts, etc.	2,000
4. Increase in public debt	82,800

*Note:* The figures in this table are given only for the purpose of illustrating the technique being described and are not forecasts. It may be assumed that the estimates refer to a period of four or five years.

*Sources of data:*

1. Official estimates: *Treasury Bulletin*, "Means of Financing Cash Requirements." Actual data on a monthly and fiscal year basis is also reported in this publication.
2. Projections of data in Tables IV and V.

TABLE XI  
CHANGE IN OWNERSHIP OF PUBLIC DEBT

CALENDAR YEARS

Millions of Dollars

	<i>December 30, Assumption</i>			<i>Source of</i>
	<i>1944</i>	<i>Increase</i>	<i>Total</i>	<i>Data</i>
I. Total public debt, including guaranteed issues	232,144	82,800	314,944	DS
II. United States savings bonds	40,360	(10,000)	30,360	DS
III. Treasury tax and savings notes	9,843	(3,586)	6,257	DS
IV. Special issues	16,326	8,000	24,326	DS
V. Matured debt and debt bearing no interest	1,783	2,000	3,783	DS
VI. Adjusted service bonds, depositary bonds	714	250	964	DS
VII. Guaranteed issues (interest-bearing)	1,470	(1,470)	..	DS
VIII. Public marketable interest-bearing debt	161,648	87,606	249,254	DS
IX. Public marketable interest-bearing securities (including guaranteed issues)	162,843	87,606	250,449	TS
A. Federal Reserve Banks	18,844	12,000	30,844	SD

B. Insurance companies and savings banks	27,281	30,000	57,281	TS
C. Government agencies and trust funds	5,340	5,000	10,340	TS (a)
D. Others	39,670	(8,000)	31,670	TS
E. Commercial banks	71,708	48,606	120,314	TS

*Sources:*

- I. Assumptions: The estimated change in public debt is taken from Table X. The other assumptions represent reasonable judgments made by the person doing the forecasting.  
*Note:* The figures given in the table are for illustrative purposes only and are not forecasts.
- II. Items: All items are reported in the *Treasury Bulletin*.  
 DS Table: "Detailed Statement of the Public Debt and Guaranteed Obligations of the United States Government," part B  
 TS Table: "Treasury Survey of Ownership of Securities, Table 2, Public Marketable Interest-Bearing Securities"  
 (a) Figures for Federal Reserve Banks (Item IX, A) deducted from total given for government agencies, etc., and Federal Reserve Banks  
 SD Table: "Summary Distribution by Classes of Holders of Interest-Bearing Securities Issued by United States Government and Guaranteed by United States"

TABLE XII  
 FUTURE MONEY SUPPLY  
 CALENDAR YEARS  
 Millions of Dollars

	Dec. 30, 1944	Assumption Increase	Total	Source of Data Table Number
I. Sources of money				
A. All active banks				
1. Loans and discounts	26,102	4,000	30,102	IX and XI
2. Investments	94,011	48,606	142,617	IX and XI
B. Federal Reserve Bank credit outstanding	19,821	12,000	31,821	IX and XI
C. Monetized gold stock	18,498	(1,000)	17,498	IX and original estimate
Total	..	63,606	..	
II. Offsets (Deduct)				
A. Capital funds (of all banks)	9,046	1,000	10,046	IX and original estimate

**III. Total change in money**

supply	..	62,606	..
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IV. Money supply	150,988	62,606	213,594
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*Note:* 1. Estimated changes in other items listed as sources of money or as offsets to sources (see Table IX) should be entered in this table if such changes are considered important.

2. Figures in the table are for illustrative purposes only and are not forecasts.

## CHAPTER VIII

### COMPETITION

A forecast of sales or profits to be obtained by a company is not really useful unless the probable actions of competitors have been thoroughly considered in the process of making the estimate.

Competition is a struggle between companies for the trade of customers. Consequently, any action which may induce customers to buy from a particular company is a competitive effort. Such efforts may range from cost reduction to the invention of new products. In fact, there is hardly any activity undertaken by the employee of a company which is not performed in competition with work done by the employees of other companies.

Competitive relationships may be classified in a variety of ways. For the purposes of this book, competition may be divided into interindustry and intraindustry struggle.

#### INTERINDUSTRY COMPETITION

Interindustry competitive effort largely consists of action taken to induce consumers to buy the products of one industry rather than those of another. Trade may be won by offering better values or by developing new products to be sold as substitutes for commodities commonly purchased.

The effects of interindustry competition and the trends which may be expected to obtain in the future may be measured as follows. Some general, pertinent measurement of the demand for the product, such as national income, disposable income, industrial production, the output of a consuming industry, is mathematically correlated\* with industry sales of a particular product. After a regression has been calculated, the deviations of the actual values from the values obtained from the regression are arranged in chronological order. By this means it sometimes is possible to indicate an approximation of the secular (long-

\* See page 153.

term) trend of market acceptance for a product during the past. By projecting a regression fitted to the deviations arranged in chronological order, it frequently is possible to determine the future competitive status of a product. When using this technique, care must be taken to obtain sufficient data covering past experience to enable the estimator to place confidence in the results obtained. Furthermore, it is essential that the results of such a calculation be reasonable in view of what is known about the business.

In some instances, when it is evident that the market for a product is being reduced by the inroads of substitute commodities, it is advantageous to combine the statistics of industry output for both products and estimate the rate of replacement which might be expected to obtain as a projection of the existing trend. These calculations should be made by a person having a comprehensive knowledge of the products and the market.

### INTRAINDUSTRY COMPETITION

Although interindustry competition is an important factor to be considered when making long-range forecasts for various purposes, the competition between companies within an industry always is of immediate importance. It is convenient to classify the competitive efforts of the companies within a single industry into three categories. These three types of effort are listed as being the three controllable factors which influence the volume of sales and profits described at the beginning of Chapter III on page 19.

There are several ways in which the intraindustry competitive position of a company may be measured and analyzed.

First, there is the percentage of an industry's business secured by a company. When a trade association exists, industry sales figures generally are obtainable, and the problem of ascertaining how much a given company obtains of the total market for the product is readily determinable. When association statistics are not available, the operating statements of competitors and information obtained from the Census of Manufactures may be used to develop an estimate of industry sales.

In instances in which it is very important to know the status of competitive relationships in certain sections of the country,



the market survey probably is the most effective if not the sole method for determining competitive position.

If statistics are available, it is desirable to maintain a graphic record of the proportion of industry demand obtained by a given company on a monthly basis. On such a chart the movements of the curve should be studied as being indicative of the results obtained by the separate, different, important competitive efforts put forth by the organization and its competitors. The percentage of sales obtained by a company is indicative of the results of a struggle in which the competing enterprises exert pressure on customers to buy their products. Whenever the proportion of an industry's sales obtained by a company is reduced, it may be understood that the relative pressure or force of competing enterprises has been increased. Whenever the management of a company increases its proportion of the industry's sales, it may be thought that the company has exerted a more effective effort than competitors. Thus, the curve on the graphic record of a company's competitive position may be considered to represent a measurement of the strength of the competitive efforts of the company relative to the efforts of competitors.

In Figure 8.1 is a graph showing the percentage of an industry's sales obtained by a particular company. On this diagram is indicated the impact of several competitive efforts which might obtain during the course of 10 months in the conduct of a business. The arrows are used to indicate that opposing forces are exerted by a company and its competitors. In practice, it is not necessary to list important developments in competition on such a chart, although this custom may be useful.

It will be found that the competitive position of many large companies does not change substantially over the course of a year or two unless a major innovation is introduced permitting one or more of the competing enterprises to enjoy a new competitive advantage. Stability of competitive position results from the fact that when one organization gains a temporary advantage the management of other companies is stimulated to increase competitive effort. In this way the efforts of one management are countered or offset by the activities of opponents in the struggle for trade. It is true that the competitive position of a company may be changed substantially for short periods of time, but it may be observed that the long-term relationship is usually altered

in a relatively gradual manner. Consequently, it frequently is possible to project measurements of gradual growth or deterioration in competitive position and to use such calculations as forecasts of future relationships—if there is logical reason to believe that the existing trends will be continued.

While the statistician may be in a position to measure quantitative changes in competitive relationships, other members of his organization generally must provide the specific reasons why

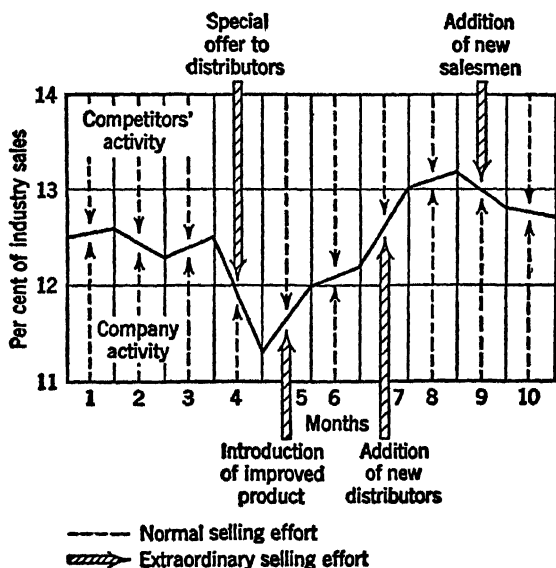


FIG. 8.1. Company sales as a percentage of industry sales.

changes occur. The sales department, in particular, is the major source of information in regard to activities which are planned by a company with the object of changing competitive position. A sales manager may be thought of as being a general directing his forces against opponents. The salesmen and persons engaged in market research are in direct contact with customers. Consequently, it is the function of those members of the organization to know what is happening in the market, what specific action is being taken by competitors, and what efforts are to be made to gain either a larger proportion of the market or to offset the activities of competing organizations. Thus it is imperative to obtain the assistance of the sales manager, who is conversant with

competitive relationships on both tactical and strategic levels, to develop a really useful estimate of the future competitive position.

### OPERATING RATIOS

The financial statements of competitors must be analyzed in order for competitive relationships to be understood and forecast. From balance sheets and operating statements, four important ratios may be obtained. These are:

1. The cost of manufacturing as a percentage of sales.
2. The cost of distribution and general administration as a percentage of sales.
3. Net income before taxes as a percentage of sales.
4. Net income before taxes as a percentage of capital employed.

By using these ratios, it frequently is possible to determine which members of an industry are most efficient in manufacturing a product or line of commodities. By comparing the relative costs of distribution and administration incurred by different companies, it is possible to isolate the most efficient distributors in an industry.

Profit margins and yield on investment are highly important figures from the point of view of one who is interested in forecasting the future trend of prices and profits, because these figures indicate which companies are in a position to determine the price level of an industry. If the efficient companies in an industry are obtaining reasonable profits and the shareholders of these companies are obtaining a satisfactory return from their investment, there generally is little reason to assume that prices will be increased unless costs rise on an industry-wide basis.

When it is foreseen that the volume of an industry will be reduced during a general recession of business activity, it is reasonable to suppose that the companies which are most efficient in manufacturing and distributing—and thus have the widest profit margins—will be in a position to reduce prices in an effort to maintain the volume of sales desired. When prices are reduced under such circumstances, it may be entirely possible for the efficient enterprises to retain reasonable profits, while the less efficient enterprises are forced to operate at a loss. Consequently, a forecast of prices and profits must be based on an understanding

of how much profit competitors probably will be able to obtain with the level of selling prices anticipated. Failure to understand the importance of these relationships sometimes leads management to overestimate potential profits. This is particularly true when the profits to be obtained from the conduct of a business new to a given management are being estimated.

Fairly definite relationships between income and distribution costs and sales and manufacturing costs must be obtained if a company is to be successful in a particular business. Established companies have been in existence long enough, and their businesses have been subjected to enough effort to reduce costs, so that a relatively common technology and merchandising practice often has been developed by the existing enterprises in an industry. These similarities in technique are reflected in similar operating ratios, which reflect, of course, the relative qualities of the products produced by different companies, the prices obtained, the size of the organizations involved, the effectiveness of research, differentials in plant locations, etc. Consequently, the practicing economist should possess an adequate knowledge of the operating ratios which will obtain in the efficient enterprises in different kinds of industries. The acquisition of such knowledge requires more than casual observation and study.

One of the best ways to obtain an understanding of how to use operating ratios is to invest personal funds in common stock. From this procedure the economist may expect to learn that operating ratios are important measurements of competitive efficiency, for the preservation of and opportunity to increase his capital will be affected by his ability to use this type of information.

A supplementary method of learning to use operating ratios in forecasting consists of studying Moody's "Industrials." This manual can be used to develop a knowledge of operating ratios by the following procedure. A second person reads from the manual a description of a business. The year involved and the approximate size of the company are stated. Being given this information, the person learning to estimate should attempt to determine approximations of the ratio of manufacturing costs to total income, the ratio of selling and administrative expense to sales, and to make an estimate of the profit which might be expected to be obtained by an efficient company. After several

years of practicing this procedure, the estimator should be able to state the approximate operating ratios of different types of businesses in various periods of time. The fact that operating ratios shift according to the status of the business cycle, also, will be more completely understood if the procedure described is followed.

## CHAPTER IX

### BUSINESS CYCLES

The business cycle is the fluctuation of business activity about the level of equilibrium.

In a real sense, business cycles result from the fact that individuals may defer producing or purchasing commodities. Consequently, the people of a nation who have attained a relatively high scale of living are more apt to experience cyclical fluctuations in production and prices than are a people who do not produce and consume commodities which they can do without.

Much time and energy can be spent endeavoring to find the secret of the business cycle. Many of these attempts resemble the efforts of the alchemists to find the philosopher's stone. Actually there probably is little that is not known about business cycles. Those who are interested will find a considerable body of literature available; but, owing partly to the complexity of the subject, a successful use or command of existing knowledge is not common.

Persons attempting to use the concept of a business cycle should be thoroughly familiar with the excellent studies which have been published. In the bibliography for this chapter is a list of standard works which are recommended for the attention of the individual attempting to apply the technique of business forecasting. Because this book is primarily an outline of technique, only a brief description is given of general theory in regard to the business cycle.

It would be desirable to begin the description of how a cyclical movement is developed with a situation in which the economy is in a state of equilibrium. To do so, however, would be unrealistic, because such a situation never exists. Instead, it may be assumed that the economy is in the first phase of recovery from a major depression. When recovery begins, managers and entrepreneurs are inclined to adopt a conservative attitude toward the investment of capital and other expenditure. Most consumers—still smarting from the effects of a past economic situation in which income was reduced and purchasing power was considered

inadequate—are inclined to be wary about undertaking responsibility for debt and, as a result, seek to acquire or maintain liquid savings. Yet a relatively few managers and consumers adopt the conclusion that prices are lower than they may be in the future, and seek to obtain some advantage from either undertaking the risk of investing capital or spending past or current savings. When these persons take action, total expenditure for investment or consumption is increased. In this way a rise in activity is generated. Prices tend to be increased, more people are employed, incomes and profits rise, with the result that optimistic expectations are developed by more individuals.

With the passage of time it is made evident that a measure of boldness in economic undertakings has produced satisfactory results in the recent past. The individuals who tend to take chances frequently find that their audacity is well rewarded. Persons with savings to invest are encouraged to place their funds by learning about the profits of those who made money through assuming the risks of ownership. Even the reckless may obtain substantial rewards from their undertakings at this stage.

After a period of time, the caution and pessimistic expectations common in the depression period are eroded by recognition of the success attending the economic ventures of the aggressive and the reckless. When this psychological stage is reached, economic activity is rapidly expanded. Capital becomes relatively easy to obtain. Income is high, and success in business activity and personal economic endeavor is widespread. During this period many ventures are originated which would not have been undertaken in the previous period because expectations were low or capital was lacking.

Finally, continued success in economic venture generates a psychology in which it is commonly believed that profit is the result of business activity—rather than being a reward for providing useful products at prices which customers are willing and able to pay. In this period numerous uneconomic ventures are originated. It becomes natural to assume that the expansion of productive activity which has occurred will be continued indefinitely. The audacious are admired, respected, and emulated. Wishes are treated as facts. Managers liberate themselves from the conservative attitudes which restrained them from undertaking activities which would have been profitable in the recent

past. A recognition of lost opportunities acts as a spur to new undertakings. Numerous consumers become oriented to a higher level of income and assume financial responsibilities which they cannot fulfill. When this situation has been attained, national output is above the level of equilibrium, with the result that some concatenation of events will precipitate a decline in expenditure for investment and consumption.

After the recovery movement has been developed to the point at which the economy is in an unstable situation, a recession may be originated by any combination of factors which causes the expectations of managers and consumers to be reduced. When conservative and cautious policies and practices are adopted in the management of business and individual income, a spiral of deflation is developed. This process is continued until the trough of the depression is reached.

During the deflation many wasteful uneconomic enterprises are liquidated. Substantial wealth is lost by the reckless. Audacity in economic affairs is considered to be a cause of failure. Optimistic expectations fade and are obliterated by a recognition of the lack of success attending the economic efforts of the aggressive. The least loss or the largest profit is obtained by those who adopted conservative practices and policies when the majority of managers and consumers were enjoying the most optimistic expectations. Aggressive policies and practices are discredited, and the utmost conservatism is admired and emulated. National output is reduced and prices fall as managers and individuals strive to adjust expenses to declining incomes. Expenditures are reduced in an attempt to accumulate liquid savings. Prices fall until bargains are common but are generally unrecognized. Finally, a stage in the recession is reached when some combination of events will engender more optimistic expectations in the minds of astute consumers and managers, with the result that a recovery movement is originated.

The foregoing description of the cyclical changes in the expectations of individuals and managers may be taken as being an outline of the dynamics of human psychology during the business cycle. To some persons the description of these changes in mental attitudes may appear to be a most superficial analysis of what happens over the course of the business cycle. Students of cyclical fluctuations in business activity are accus-



tomed to use much more specific descriptions of what happens in terms of interest rates; the prices of steel, wheat, and cotton; bank debits; and other definite measurements of economic phenomena. Actually these are results, which, when experienced, affect human attitudes. The expectations which cause changes in these specific economic factors are both rational and emotional in nature. It may be concluded, therefore, that the task of anticipating cyclical developments in business activity involves continual critical study of the psychology of managers and customers.

It is to be recognized that in any given economic situation there are many groups of individuals with different interests, opinions, and judgments. The population of the economy does not possess a homogeneous psychology or philosophy. There may be a preponderant but not a universal opinion. Consequently, it is imperative to observe, recognize, and evaluate the reactions of different types of persons with various backgrounds and different responsibilities to changes in the economic situation. Incidentally, it is to be noted that the lack of homogeneity of opinion in regard to economic affairs represents a major stumbling block in the way to success of those who advocate centralized economic planning in our economy—where individuals are permitted to possess private property and act largely on their own judgments.

If records of the fluctuations in the volume of national output and prices are studied and an objective analysis is made of the dynamics of human economic behavior, three important conclusions may be drawn about the cyclical movement of business activity. In the first place, it may be observed that there is more than one kind of a business cycle. Second, it is apparent that there is no rigid periodicity or rhythm. Finally, it may be concluded that the only common motivating factor in all business cycles is human expectation, which, in turn, is affected by both reason and emotion. Whether reason or emotion is the dominating factor depends on the individual or group of persons concerned and the situation in which they live. It may also be observed that many people appear to be influenced more by emotion than by reason and, at any time, tend to form expectations on the basis of experience in the recent past.

The task of forecasting the nature of future business conditions cannot be most successfully accomplished by dealing in the

abstract terms of individual and group psychology alone. The judgments derived from such observations must be related to reasonably definite measurements of cyclical fluctuations in business activity. To this end it is helpful to break down or decompose by statistical manipulation an index of business activity into component elements.\* It is possible to decompose series representing national income, national production, wholesale prices, the cost of living, equity prices, and other measures of national economic activity into at least two cyclical components.

### SHORT-TERM CYCLE

By decomposing an index of industrial production, one cycle with a period of 41 months can be isolated. A second cycle with a period of more than 10 years, also, may be obtained. In addition to these two elements, one may observe the effect of "accidents" in an historical series. In Figure 9.1 are sketched the various elements which may be considered to exist in an index of business activity. First, a secular or long-term trend may be discerned. This trend continues over the course of many decades. Second, there is the "short-term" or 41-month cycle which often is obliterated by the development of another cyclical movement, listed as the "long-term" cycle, with a periodicity of more than 10 years. In addition to the foregoing components, the possible effect of "accidents," such as, a presidential election, an important tax bill, and a drought, are indicated in the sketch given.

The concept of the business cycle, as outlined in Figure 9.1, has been used for many years in the forecasting work done by the Armstrong Cork Company. The periodicities given, although useful, should not be employed as immutable measures. Actually they may be either shortened or extended by circumstances peculiar to the situation involved. Both of the cyclical periodicities, however, can be used in forecasting if the reasons why such cycles might be expected to exist are understood and considered when projections are being made.

Apparently the reason why the concept of short-term cycles can be used with some degree of confidence lies in the way businessmen formulate purchasing, production, and expansion policies,

\* Statistical decomposition involves calculating the various equilibrium values in a series and the mathematical difference of each.

and consumers manage their personal finances. On the basis of experience, it may be assumed that enough business managers in the economy will grow overoptimistic regarding the prospects for their businesses over the course of 24 to 36 months of rising activity to produce an appreciable amount of disequilibrium in

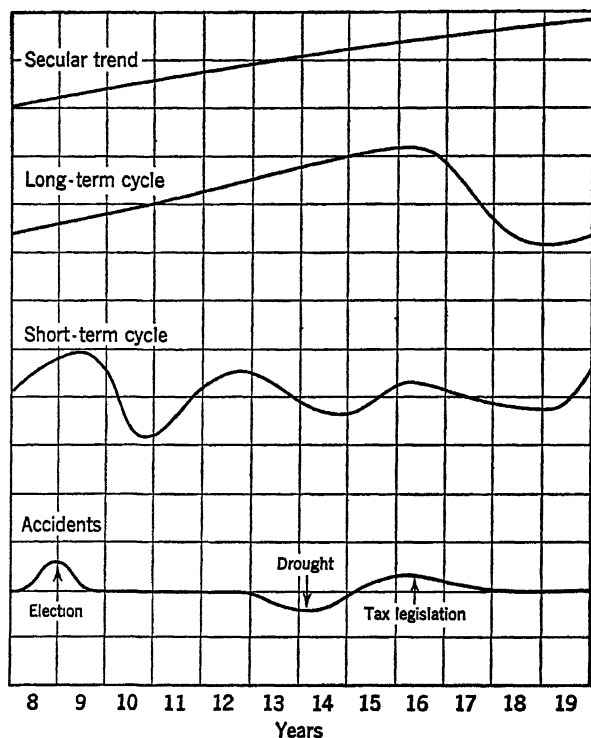


FIG. 9.1. Cyclical components of an index of business activity.

the economy, and, during the same period, consumers will acquire what they will consider to be temporarily adequate stocks of commodities.

It is to be doubted that the accumulation of excess inventories is a situation which precipitates the recession phase of the short-term business cycle. In some businesses, particularly those engaged in distribution, slow-moving inventories may be developed during the peak phase of the cycle, but the important rise in inventories occurs when sales are being reduced and not before sales decline. Manufacturers who are producing at a high rate

and who experience a recession in sales accumulate inventories rapidly if they have overestimated the demand for their products. For many months preceding the cyclical peak, the recurring interest of management has been to enlarge inventories to the point where sales could be serviced best and competitive position improved. At the peak of the short-term cycle most companies do not find inadequate inventories troublesome; but, if, for any of a number of reasons, the sales volume is reduced, a rapid accumulation of inventory becomes a major problem.

Possibly the most important inventories to be considered in connection with the short-term cycle are those possessed by ultimate consumers. When families possess reasonably satisfactory stocks of the durable items included in the family budget, national activity is well above the level of equilibrium. If, at such a time, consumers decide to pay off their debts and accumulate liquid savings, a short-term decline in the volume of business may be originated. Thus, the task of forecasting a turn in the short-term cycle involves an observation of the way in which individuals are financing their purchases and what kind of goods they are tending to buy and accumulate.

There was evidence of a short-term cycle in business activity long before the production of consumers' durable goods became such an important part of total national output. This cycle, also, was to be found before installment selling was a common practice. In the years before the First World War, the high degree of regularity in the short-term cycle apparently was partly a result of the limits to which bank credit could be expanded. Because of this fact, the short-term cycle could have been forecast with a high degree of success by studying the movement of interest rates and related phenomena. Since the institution of the Federal Reserve System, and, particularly, since the Federal Government has undertaken to manage the level of interest rates in the United States, interest rates have not been so important a determinant of the short-term cycle as was the case in prior years. This leads to the conclusion that in the future the effects of centralized monetary management must be studied as determinants of fluctuations in business activity of much more consequence than the short-term cycle under consideration.

By determining an approximate level of equilibrium for a 41-month period, it is possible to obtain a measurement of the

degree of tension in the economy existing after an 18- to 24-month rise in business activity. When such a determination has been made, the economist should watch for the further development of a critical economic situation in which some series of events will bring about the eventual recession. By using this technique, the general pattern and level of business activity sometimes can be forecast for several years in advance.

### LONG-TERM CYCLE

The second typical cycle to be found in national output occurs over a period of 10 to 15 years. This movement may be termed the "long-term" cycle. This fluctuation in business activity has existed since the industrial revolution. A long-term cycle may be considered to be composed of a series of short-term cycles. Consequently, the last short-term cycle in the series contains all of the disequilibria which precipitate the final phase of the long-term cycle. Thus, it may be assumed that the recovery and boom phases of the long-term cycle represent periods during which the potential effects of actions taken during the short-term cycles are accumulated.

The long-term cycle begins either in a period of depression or whenever a change of the first magnitude is made in the monetary structure. During the development of this cycle, more and more capital is invested, with the result that the volume of production and consumer income is increased. Finally, a large quantity of extramarginal capital facilities is accumulated, inefficient businesses have been developed, construction has been expanded far past the apparent temporary needs of the Nation, and, after a crisis, a prolonged and deep recession in business activity is originated and continued to the trough of a major depression.

After business activity and profits have been rising for five years or longer, and if capital is relatively easy to obtain, it is to be expected that many aggressive managers will be led to invest capital in businesses which are not economic. Possibly capital will be invested in fixed assets which prove to be extramarginal in character. Businesses may be expanded to undertake functions which cannot be performed profitably in competition with existing producers. Perhaps the organization of a business may be expanded to the point where the expenditure for personnel repre-

sents some substantial measure of waste because there is no appreciable opportunity for the persons involved to do something for which the customers of the enterprise will be willing to pay. When it is apparent that such conditions obtain in a large number of businesses, it generally may be observed that the return on capital is being reduced. Then it is to be expected that a recession of substantial proportions is in the offing. At this time the economist must search for the developments and events which will precipitate the eventual decline in economic activity.

These are important differences in the factors to be considered in forecasting the long- and short-term cycles. In forecasting the short-term cycle, the economist must consider the development and effects of the operating policies practiced by management and the policies followed by consumers in deciding whether or not to save income or purchase durable goods. In forecasting the long-term cycle the volume of investment in fixed assets by business enterprise and all factors bearing on this matter are of major importance.

The duration of the rising movement in the long-term cycle is affected by the means available for financing the boom phase. In the past the discovery of gold or the development of ways and means for monetizing government indebtedness has influenced the development of long-term cycles. When the boom phase of the long-term cycle in national output is prolonged by means of financial expedients, it is to be expected that so many unstable uneconomic situations will be developed in the economy that a greater than ordinary depression will be precipitated when the expansion phase is terminated. Consequently, government economic and fiscal policies and the activities of the banks must be studied carefully by the practicing economist attempting to forecast the course of the long-term cycle.

By estimating the apparent level of equilibrium for a cycle with a periodicity of 10 years or longer, it is not difficult to understand either the approximate degree of tension existing in the economy or the probable extent of deflation to be experienced in the future.

Apparently both the short- and long-term cycles are developed by decisions made and policies practiced by individuals acting as either consumers or managers. Expectations are not changed on the basis of some standard periodicity. There is so much variation

in the factors which influence human expectation in different periods of time that the procedure of forecasting business cycles by means of standard periodicities is almost certain to lead to disaster. The cyclical periodicities given in the foregoing paragraphs cannot be applied rigidly, but an understanding of such timings and why they exist may be used to sharpen observation of the evolution of changes in expectations which are the important determinants of cyclical fluctuations in business.

### CULTURAL DYNAMICS

There is another cycle in social life which should be considered in forecasting the future business situation. This fluctuation is the evolutionary change on an historical basis which may be discerned in the culture of peoples. The development of cultural change is so slow and natural and the change is so profound that it generally is either ignored or not understood.

A cultural change consists largely of a revision of what is considered to be truth, of a shift in values, of a change in the common understanding of what is real. Being on an ideological basis, the subject matter of a culture is intangible, abstract, and difficult to measure or even comprehend. Actually, the differences between the ideas of the past and the ideas of today are not particularly noticeable except to persons interested in and competent to make such comparisons.

The apparent reason why we find fluctuations in the culture of society is that there are always a few intelligent articulate persons who can suggest ways and means of solving the social or political and economic problems of any given period. When a great number of influential people of a society become dissatisfied with the commonly accepted conditions and philosophy, they tend to accept and support the ideas of the iconoclasts who are able to point out what is wrong and the action to be taken to correct both the undesirable situations and the discredited philosophies. In this way a new assortment of social and personal values is developed and accepted. After a period of time the people of the society again become dissatisfied and adopt a still different ideology.

Cultural evolution is carried to the point where extreme ideologies are commonly held. An extreme of this kind exists

when individuals measure all things in terms of material values. The opposite of this point of view exists when material values are practically ignored and the majority of values are spiritual. At one extreme the long-term point of view is dominant; whereas at the other extreme the short-term is considered to be of paramount importance.

In the matter of social organization, we are able to witness the two abstract cultural extremes of anarchism and totalitarianism. In political organization the comparable extremes are democracy and autocracy. As may be seen, such cultural changes are very important, because an understanding of the direction of such tides in human affairs enables the economist to foresee the natural development of government policies; the kinds of economic theories which will be espoused by social leadership; the general nature of legislation affecting business, such as tax legislation, tariffs, fiat economic controls, changes in the monetary structure; changes in the demand for different types of products; and other matters which are of importance to the person forecasting the volume and pattern of business.

The reader who is interested in the subject of cultural change is referred to three works published in current times in which the problem of social dynamics is treated. The works recommended are those of Vilfredo Pareto, Pitirim Sorokin, and Ortega y Gasset which are listed in the bibliography.

### SEASONAL FLUCTUATIONS

The sales of some kinds of merchandise fluctuate about the annual level of equilibrium in approximately the same pattern year after year. These cycles form a recurring seasonal pattern and generally are known as the seasonal trend of sales.

Any of a number of well-known statistical techniques is available for measuring seasonal trends and for adjusting sales data for seasonal variation. Before using such devices, it is important to determine whether or not a product under consideration actually is sold on a seasonal basis. In some instances it will be found that a particular sales curve will follow an apparently seasonal pattern for several years due to coincidence alone. If these sales data are used to calculate a normal seasonal pattern and this instrument is used in forecasting, the results obtained may be



disastrous. Consequently, it is advisable to avoid using estimates of seasonal patterns unless an analysis of the reasons why customers purchase a product indicate that there is a definite connection between seasons of the year and purchase of the commodity.

In the Armstrong Cork Company the seasonal trend of a product sometimes is established by drawing a free-hand curve on a graph. The monthly sales for a number of years are superimposed on a chart, so that all Januarys are plotted on one ordinate, all Februarys on another, etc. By this means deviations due to nonrecurring conditions are indicated and readily eliminated.

Another graph frequently is employed in the process of disintegrating an annual or semiannual estimate into monthly forecasts. On a three-cycle semilogarithmic chart past sales are plotted for monthly, quarterly, semiannual, and annual periods. The annual data sometimes are a 12-month moving average. By this means four curves are made available. In using this device the annual estimate is first broken into two 6-month forecasts; these, in turn, are reduced to quarterly estimates; and the quarterly estimates are disintegrated into monthly forecasts.

Still another method of estimating seasonal trends sometimes is used. Monthly sales for past years are calculated as percentages of the annual totals. Next the monthly percentages are accumulated to develop series which indicate what proportion of annual sales was experienced during the first month, the first three months, the first half, the first three quarters, etc. When these measures are to be used, the cumulative percentages for past years, during which a cyclical pattern was experienced similar to that which is forecast for the prospective year, are selected. This involves forecasting the general pattern of business activity irrespective of seasonal trend. Then, with an estimate of total probable sales during the year provided, monthly estimates are obtained by using averages derived from the selected series. The total for the year is first broken into halves and then quarters, and the quarters are separated into estimates for individual months.

## CHAPTER X

### ECONOMIC MODELS

Economic models are comprehensive schematic descriptions of specific economic situations expressed in mathematical terms. In recent years it has become quite fashionable to use models in dealing with national economics. Being in the vogue, these instruments sometimes have been used to dignify illogical assumptions with a mantle of precise arithmetic. Because of this practice, some experienced economists are inclined to lift their eyebrows at the use of these mathematical devices. They can be useful, however, for the purposes of persons who are interested in trying to forecast the development of actual situations in the economy.

The models used in business forecasting may be made by extending the various statistical series indicated in the 12 tables outlined in Chapter VII. When properly integrated estimates are entered on these tables, the finished complete tables are a statistical model of the economy as it is expected to be in the future.

A model should be a complex of estimates concerning the level and pattern of expectations as expressed in terms of national output, national income, private gross capital formation, consumers' expenditures, tax receipts, government expenditure, price levels, the indicated use of money, inventory change, etc. These and other pertinent factors may be integrated so that the model becomes a relatively definite comprehensive expression of relationships to be anticipated in the economy. On the other hand, a model may be nothing more than an impressive melange of statistical abracadabra.

Mathematical models should be based on reasonable judgments. In developing the component estimates, the personal desire of the economist must be eliminated. Although models sometimes are used by persons proselyting economic reform, the practice of adulterating reason with desire is not permissible for the economist attempting to forecast actual economic conditions.

A number of advantages may be derived from the use of economic models. The economist is able to integrate a large

number of different ideas; and, by having a means by which many concepts may be integrated, he is better able to ascertain the probable complementary effects of specific factors of importance in economic and political life. Consequently, a facility in the use of models is a distinct asset in dealing with the dynamic aspects of the economy.

Properly constructed, a comprehensive model is a definite mathematical expression of an "estimate of the situation." Consequently, it will be found that the construction of models will assist the economist in making a more comprehensive and better integrated "estimate of the situation," and will minimize the chance that he will ignore relationships or factors of importance.

The economist using models not only is able to integrate many factors but also actually is forced to do so, especially when calculating what results probably will be developed by a given change in some factor of importance. Although it is possible, when theorizing, to assume that this or that will happen when "other things are equal," in actual economic life, this famous qualifying assumption seldom, if ever, can be applied. By using mathematical models, the practicing economist should be obliged to recognize this fact.

Finally, the economic model is expressed in mathematical terms. As a result, it is possible to use the definite estimates in the model as points of reference in calculating the demand, sales, prices, and profits for a particular product.

There are a number of pitfalls which lie in the path of the unwary economist using statistics of this kind. It apparently is easy for the mathematician to forget that the statistics of economic life are measurements of the results of human activities. Consequently, there is danger that the person using models may conclude that economic activity may be controlled by forcing people to adopt behavior which will shift the statistics into a representation of a more desirable situation. The wisdom of forcing the people of an economy to do that which will make the statistics look right is equivalent to that demonstrated by an engineer who attempts to determine the pressure in a steam boiler by manipulating the pressure gauge. This is the error of confusing symptoms with causes. Actually, when the economic activities of individuals are made subject to political coercion,

their behavior frequently is neither anticipated nor considered desirable by their rulers.

It has been a common practice of some theorists, subscribing to selected elements of Keynesian theory, to assume that government expenditure is the major variable factor affecting national output. With this idea in mind, some economists have constructed economic models in which government expenditure and tax receipts are treated as determining and controlling independent variables. In this type of calculation private gross capital formation and consumer expenditure are considered to be determined largely by the magnitude of government spending and the degree of success attending the efforts of the political authorities to redistribute income among various recipients. The effect of government expenditure on entrepreneurial, managerial, and investor expectations is either rationalized or ignored, and the cumulative effects of government spending are not taken into serious consideration. The businessman who adopts judgments derived from this unimaginative use of statistics and economic theory will eventually find himself in serious difficulty because the results of his activities will be so different from his expectations.

Because the model is expressed in mathematical terms, it is easy to fall into the error of using statistics as a part of a definite precise "scientific" equation, into which the statistician can introduce a certain quantity of dollars of government expenditure and obtain so many dollars of private investment, consumption, and employment. This misuse of the statistics is a result of ignoring the seemingly obvious fact that individuals are not automatons.

One way to avoid misusing a forecasting technique involving the use of models is to bear always in mind the fact that the mathematics employed are symbols of the results of human behavior and that, if confidence is to be placed in the estimates obtained by using the technique, the mathematical measurements must be derived from a realistic evaluation of how persons performing different economic and political functions presumably will act in the situations under consideration.

While it is useful to possess correlations between the important statistical series used in constructing models of the economy, these formulae must be used with circumspection. The historical statistics available have been affected by great fluctuations in busi-

ness activity. The impact of wars, changes in tax policy, changes in the monetary system, and other factors of major importance have produced an almost constant state of disequilibrium in the economy. As a result, it is almost impossible to determine precisely what relationships might exist in the economy if a position of perfect and continued equilibrium were to be obtained. In a situation of continued equilibrium, unvarying relationships would exist between disposable income and consumption, consumption and the money supply, corporate savings and corporate income, taxes and investment, and other similar matters. It is made obvious, by an inspection of actual records, that there may be considerable variation in the relationship between national income, or government expenditure, and the output of a given industry. A model in which it is assumed that a condition of almost complete equilibrium will obtain is almost worthless for the purposes of business forecasting. Yet there generally is a fairly reasonable explanation as to why maladjustments are to be found in different elements of the economy in different periods. Therefore, the models used in business forecasting should be derived from careful reasoning and critical observation rather than from either the projection of purely mathematical relationships keyed to government spending or any other single factor taken as the controllable variable determinant of output in a model of the economy.

A majority of the economic models published are based on the assumption that either perfect equilibrium or a desired situation in the economy will obtain. Actually, the relationships between elements of the economy will evidence considerable imbalance reflecting the cumulative effects of errors in judgments made by political authorities, by management in the investment of capital, and by consumers in the expenditure of income. As a result, the businessman is well advised to be wary of accepting either the conclusions or the figures derived from models which are published unless he knows the author by work or reputation.

In projecting the series of which a model is composed, the most effective results can be obtained by extending actual data by means of logic, analogy, calculated trends, standard periodicities, and estimates of the disequilibria concerned. When the important key series have been projected, the interrelationships involved should be inspected and compared with the evidence of past

experience. If unreasonable relationships are found, the whole series of judgments on which the apparently erroneous estimates are based should be reviewed. By this means individual estimates in one set of terms may be checked with those made on a different basis. This procedure frequently results in improving the quality of all the estimates of which a model is composed.

In some situations it will be found that more than one model can be constructed. For example: At the beginning of the war it was possible to conceive of a number of different time periods to represent the duration of hostilities. It was also possible to estimate several different levels of taxation and federal expenditure. When it is impossible to distinguish between the degree of probability of occurrence of variables of so great importance as those mentioned, it is desirable to construct models for each major variation in assumption, in order to determine what might be expected to obtain in any of the possible situations conceived. As a matter of fact, a future situation is seldom, if ever, so simple that it can be outlined for any length of time by using one model in which complete confidence may be placed.

In the models used by the Armstrong Cork Company, an attempt generally is made to incorporate estimates of the range of values which might be expected to obtain in important basic estimates, such as national income, disposable income, money supply. Although it is necessary to possess precise points of reference in making various calculations, it is very desirable to have a well-developed understanding of the possible range which may be expected to obtain in these factors. As stated in Chapter II, particular estimates can be positioned with the object of making the direction of error determinable. In general, however, it is desirable to use precise figures selected for the purpose of the final forecast and to understand the magnitude of possible error.

In the postwar forecasting done by the Armstrong Cork Company, it was assumed in the models that the end of hostilities would occur at one of three different points of time. This expedient was adopted because the management was not in a position to make a precise estimate of the time at which the war would be ended. But, since the use of mathematics in constructing models involves the adoption of definite assumptions concerning the precise timing of events of so great importance as the end of a war, three different dates were used. In this way the manage-

ment was in a position to consider what the general economic situation would be like, no matter which of the timings employed should be proved correct by subsequent events. Thus the various opportunities and dangers involved in the conduct of the business immediately after the war were made more readily understandable.

Soon after a model is constructed, it will be found that revision is necessary. Frequently the changes involved in a revision render it necessary to change many other estimates in the integrated statistical structure. In practice it will be found that the models used in practical forecasting are in a constant state of flux and require frequent attention. For this reason the system of tables described in Chapter VII was designed to facilitate making revisions with minimum effort.

An excellent example of a statistical model is to be found in a study entitled "Post-War Boom or Collapse?" by Professor Sumner H. Slichter, which was published in the August issue of the *Harvard Business Review* in 1942. In this article Professor Slichter considered the dominant economic factors to be experienced in the economy during the next four years. He assembled an integrated statistical model, based on this speculative analysis, and composed of annual estimates of the levels of gross private investment, national expenditure, disposable income of individuals, personal savings, etc. These estimates were used in the postwar planning done by men in many different businesses. Although the war was ended at a later date than that anticipated by Professor Slichter, and although the author probably would have modified some of the figures 6 months after publication, this study was a landmark for many businessmen when it was published.

In conclusion, it may be stated that the best economic model is nothing more than a precise structure of realistic assumptions and must be reviewed and modified at frequent intervals when new information is obtained and improved judgments are made.

## CHAPTER XI

### MECHANICAL FORECASTING DEVICES

A mechanical forecasting device is a system of statistics which is intended to eliminate the necessity for thinking. The naïve owner of this type of contraption introduces figures into a miraculous formula with the object of obtaining forecasts. Reason or judgment is considered to be superfluous. The use of mechanical devices is the last word in the development of an empirical technique in economic forecasting.

Mechanical devices may be grouped into two categories, according to the time period involved. Sometimes mathematical series designed to indicate developments in the immediate future are called barometers. Other statistics are used to forecast the probable timing of economic change in the course of future years. The use of both types of instruments involves an implicit adoption of the assumption that conditions which existed in the economy in the past will continue in the future.

#### BAROMETERS

Barometric forecasting devices sometimes are developed by studying the leads and lags to be found in statistical series at times when major reversals in the trend of business activity occurred in the past. Frequently such efforts are guided by a logical analysis of what particular series may be expected to experience change before others reflect the fact that the trend of activity is to be different from that which had obtained. Sensitive commodity prices, interest rates, and statistics measuring financial activity generally are the components used in making economic barometers. Not infrequently a number of series which appear to have forecasting value are combined into a single compound index, which it is anticipated will move up or down before a comparable change occurs in national output, the price level, sales, or some other factor to be forecast. One difficulty,



among others, experienced by those attempting to use compound barometric indexes is that sometimes the component elements do not vary simultaneously. When this happens the user wonders which of the component series should be considered to be in error. A more pertinent reason for not using compound barometric indexes is that it is difficult to understand just what the index actually represents.

At one time the sales of linoleum could have been forecast approximately nine months in advance by correlating linoleum sales with the F. W. Dodge figures of construction contracts awarded. At no time was complete confidence placed in the continuation of either this correlation or lead. The lack of faith was fortunate, because after almost a decade, during which the correlation was high, linoleum sales showed a wide variation from the level which would have been expected if the construction contract figures had been used as a determinant of the estimates used in managing operations. The reason confidence was not placed in the relationship was that it was difficult to understand why such a correlation should exist.

### ORDER SERIES

A second type of barometer sometimes is developed by using inventory and order statistics. After the recession of 1937, inventory and order series were given an increased vogue as a means of forecasting the trend of prices, sales, and production. It was commonly assumed that the recession of that year was due to the accumulation of inventories in excess of demand. Yet, the recession in 1937 was forecast by persons who did not possess the inventory and order series which afterwards were established. Furthermore, due to the fact that it is doubtful if the inventory and order series could have been used to forecast the 1937 recession, there is little reason to believe that these statistics will be of great importance in forecasting future recoveries and recessions. Such information is useful but must be used in conjunction with other data which probably is of more importance for the purposes of forecasting business conditions.

Sometimes considerable confidence is placed in an order series as a means of forecasting the future sales of products which are carried on inventory. Such confidence is misplaced. Although

incoming orders are a good indicator of the immediate demand for products made to order, this is not equally true of order series when used as a device to forecast the demand for standard commodities which are carried on inventory by distributors. The orders for standard commodities may fluctuate violently over a short period of time for a variety of reasons other than a change in the level of ultimate consumption. This is particularly true when changes in the merchandising tactics of a company or its competitors are occurring or are being anticipated by customers. In view of this situation, it is imperative that the reasons why orders rise or fall must be carefully analyzed before a change in the level of incoming orders is used as a guide in the development of company operating policy. If too great a reliance is placed on orders, as criteria on which operating policy is established, the business may be managed in such a way that costs are rapidly increased and the opportunities for effecting economies are reduced. It is obvious that, if the production of a commodity is reduced because orders are declining, unnecessary costs will be incurred if orders are increased soon afterwards and production is then stepped up. Furthermore the possible advantages of covering raw material requirements over an extended period of time do not exist when vacillating operating policies are followed. A business may be brought into an untenable situation if a temporary rise in orders is followed by an increase in production by which goods are produced in a greater volume than can be absorbed when orders decline. These are a few of the disturbances which can be caused in the operation of a business when the management uses an order series as a mechanical means of regulating production, raw material commitments, inventories, etc.

The practice of combining different order series to obtain a barometric index is not a means of providing a forecasting device of great utility. In the first place, it is difficult to understand what the index really is. Then, too, by the time a continued change in trend in such an index is made evident, it is too late to do very much about adjusting the business to the decline in demand. In actual practice an order series is useful largely for the purpose of checking an estimate which has been made and is being used. If it has been estimated that orders will decline, it is important to know whether or not orders are declining. Yet, when orders are declining it is generally too late to do very much about inven-

tories, raw material commitments, and other factors which must be integrated with the volume of output.

A compound index consisting of a mathematical mixture of a number of order series generally is unreliable in the sense that the user finds it difficult to tell whether a short-term reversal in trend is the beginning of an important new movement—or whether it is merely one of a number of random fluctuations. Obviously, a more profound estimate of the situation must be possessed in order to discriminate between an important change in trend and a mere temporary aberration of the statistics. Consequently, it is reasonable to suppose that the basic “estimate of the situation” is of more importance in the making of decisions with respect to the conduct of operations than is a change in a compound order series. This peculiarity of a compound order series (namely, to fluctuate without much reason) also may be observed in other compound barometric series. The user never knows whether a deviation in trend is the forerunner of a tide or merely one of numerous random ripples which must be ignored.

### SECURITY PRICES

Much time and effort has been spent developing mechanical forecasting devices and the technique of using such instruments for the purpose of forecasting the future trend of prices on the stock market. Probably the use of the Dow theory represents the most venerable of such attempts. During recent years there has been a proliferation of services which sell advice to speculators and investors based on mathematical calculations concerning the technical condition of supply and demand in the security markets.

Stock market quotations are useful as a means of evaluating the status of the expectations of a majority of people who buy and sell the assets of private enterprise. It may be observed that an average of market prices generally oscillates from a level which is so low that potential buyers are induced to take action to a level at which prices are so high that potential sellers begin to offer their holdings. Because of this characteristic of the market it is possible to discern relatively well defined range of movement in the market averages over an extended period of time. Sometimes it is possible to draw parallel lines, between which the

market averages will oscillate over a period of several years. In a bull market the parallels rise, and in a bear market these trend lines decline. Within major parallels other parallels of intermediate or minor importance may be observed.

In a rising market the low point of the previous decline and the low points of significant reactions are used to determine the lower parallel. The upper parallel is determined by the high points in the rises which occur. In a declining market the peak of the previous rise and the high points of succeeding rises are used to determine the upper parallel. The lower parallel is determined by the low points of the declines which ensue during the move. It is assumed that the averages employed will tend to back and fill between such parallels until the trend of the market is changed. When the averages break through the parallels, it is assumed that the trend of the market has been changed, particularly if the break-through is accompanied by an increased volume of trading activity.

Such means of measuring the trend of equity prices must be regarded with distrust. The averages available sometimes are not so representative of the actual trend of the market as would be desirable. Furthermore, experience in using such measures will teach the practitioner of market forecasting that they are not wholly dependable, particularly if they are used as a guide by someone who wishes to gamble a bit with enterprise ownership. Sometimes the naïve fellow who was supposed to buy stocks at the top of the parallel is not there to hold a bag into which securities can be unloaded. Another factor which apparently has decreased the utility of studying the technical aspects of market activity is that the volume of professional trading in equities has been reduced during recent years. As a consequence, there is reason to think that there will be a less rhythmic movement in the market averages in the future and that some of the rule-of-thumb measures which professional traders formerly employed to analyze the status of conditions in the stock market will be relatively useless in future situations. In fact, since 1938 technical analysis has not been quite so useful an instrument for the purposes of forecasting as was the case before that time.

On the other hand, the so-called "technical study of the market" should not be ignored. If employed in combination with an understanding of the state of more fundamental factors which

influence the level of equity prices, parallels and other mechanical devices may be of considerable assistance in the task of determining the state of disequilibrium in investor's expectations. Certainly such tools should not be neglected.

In addition to these means of obtaining empirical measurements of the state of speculators' expectations, it is possible to develop a wide variety of mechanical forecasting devices based on deviations in moving averages, the volume of odd-lot trading, the relationship of equity prices to the money supply, and the volume of trading combined with changes in prices. The measure of success to be obtained from using such instruments seems to depend to a large extent on how much other information and common sense the speculator may possess.

The kinds of mechanical devices which can be used to forecast the stock market are limited only by the imagination of their creators. At one time the author was asked to criticize an investment service which had been purchased as an experiment by an experienced investor. Apparently the recommendations which had been made in the course of the preceding year and a half, if followed, would have obtained for the investor substantial capital appreciation in addition to a satisfactory yield. On analysis several curious phrases were found in the text of the recommendations issued by the service. When these peculiarities in wording were made the subject of investigation, it was found that the recommendations were based on the movement of the planets. Yes, planets! Astrology was being used as a means of forecasting the stock markets; the future price of specific equities; and the price of wheat, cotton, and other important raw materials. The service was offered as the work of an individual who had conducted an intensive scientific study of the forces which determine economic conditions, and it was difficult to perceive that the recommendations were based on astrology.

### INTEREST RATES

Until 1924 a considerable measure of reliance might have been placed in the forecasting value of barometers based on relationships between short- and long-term interest rates, between interest rates and industrial production, and between equity prices and the volume of business activity. Since 1924, however, mechanical

devices based on the foregoing series have been almost useless for the purposes of short-term forecasting. The apparent reason why these measures have been so much less valuable is that the activities of the Federal Reserve Banks and efforts in monetary management on the part of the political authorities have changed many of the conditions of economic life. In most instances mechanical economic barometers never were very useful except for the purposes of the speculator who could reverse a position taken in securities or commodities within a few days or weeks. Frequent and quick changes in operating policy are not practical in industrial or commercial practice. Successful forecasting for the purposes of managing a business requires the development of forecasts covering probable experience over an extended period. There are few large businesses that can increase or reduce inventories in a week or two. Furthermore, once a plant has been built, it is seldom that the facilities can be liquidated without incurring substantial loss; nor can an organization be expanded or contracted over a short period of time without producing very expensive personnel problems and disturbances. Forecasts used by business management must be based on premises which are sound enough to permit the development of practical successful consistent operating policies.

### MECHANICAL CYCLES

Some mechanical statistical systems are intended to indicate when, in future years, booms, depressions, and the turning points which introduce major changes in the trend of business activity, are to be expected. One of the most common instruments in this class is the mechanical business cycle forecast.

It is possible to get into considerable trouble by adopting the view that business cycles have rigid periodicities. Generally efforts to construct mechanical forecasting devices based on standard cyclical periodicities take the following form: The long-term cycle is isolated by computing deviations from a measurement of the secular or long-term level of equilibrium. Then the movement of the short-term cycle is defined by calculating the deviation of the actual data from a smoothed measurement of the long-term cyclical trend. Finally regular sinusoids or curves are developed from the results obtained by the foregoing

procedure. These sinusoids are projected into the future to obtain estimates of when future turning points in business activity may be expected to occur. If this kind of technique is followed, unaccompanied by critical rational analysis, the estimates derived generally are useless for practical purposes. It is irrational to expect that national income will be declining exactly 13 months hence because the cyclical 41-month cycle comes to a high point 12 months in the future. Standard periodicities of this type should only be used if there is reason to believe that the conditions which have caused such periodicities to exist are, or will be, present in the current or future situation. Nevertheless, such mechanical devices sometimes can be used to advantage.

In the Armstrong Cork Company, it has been found useful to prepare sine curves derived from the measurement of past cyclical variation in industrial production. These curves are drawn on sheets of celluloid which can be placed over graphs of industrial production. This technique facilitates a comparison of standard periodicities derived from past experience with those which might be expected to obtain in the current cyclical movement of industrial production. By the use of this device an appreciation of the duration of fluctuations in business activity is enhanced and is constantly brought to mind.

### SOLAR RADIATION

Measurements of regular fluctuations in the radiation of solar energy may be used as a mechanical forecasting device. By correlating observed cycles in the radiation of solar energy with cycles in the production of agricultural crops, it was possible during some past periods of time to obtain rough estimates of the timing of fluctuations in crop production. Presumably this technique could be employed in forecasting economic conditions in an economy which is largely dependent on agricultural production. Yet, there are two reasons why the use of sun-spot theory is not a means of making accurate predictions of economic conditions in the United States. In the first place, the volume of crop production is subject to manipulation by the political authorities for years at a time. Subsidies and educational programs have been used to influence the market price of agricultural products and the types of crops planted. These have been, and may be

expected to be, matters of much importance in the determination of what farmers will produce. Secondly, it is possible to find almost any kind of cycle in the raw statistics of solar energy radiation. In using such data, it is necessary to disintegrate a series composed of the original measurements of solar radiation into component cyclical elements. By this means a variety of sine curves can be obtained. Which of these sine curves should be considered to be important is a matter of opinion, for the original data is complex and can be disintegrated into so many sinusoids that a statistician may find it difficult to determine precisely which of the numerous cycles derived from the original data is most important for the purposes of forecasting agricultural production. The research which has been done on the subject of the relationship between solar radiation and crop production is interesting and should be considered carefully in forecasting the probable volume of production and the price of agricultural products. In this connection it is worth while to study the work of Carlos Garcia-Mata, Felix I. Shaffner, and Henry L. Moore.

### MODELS

If economic models are used in forecasting, it is not difficult to perpetrate the error of using these instruments as mechanical devices. An elaborate detailed statistical model has an aspect of authenticity which does not exist. Actually the statistician can prove almost anything he may desire with the use of mathematical models. It is well to be cautious, therefore, in placing confidence in elaborate statistical models which have been developed either by one's self or by someone else. Properly used, models are a means of integrating different series, but actually these are only symbols of real economic activity.

### CRITICISM

A number of general criticisms may be made about the use of mechanical forecasting devices. In the first place, experience with the use of mechanical devices leads to the conclusion that the valid life of such an instrument is limited. Shortly after a statistical forecasting mechanism is developed, some of the conditions of economic life are changed. As a result, the useful life of the



device is ended, because the existence of the conditions upon which it was developed no longer obtains. Thus it must be stressed that no mechanical forecasting device should be used unless it is reasonable to believe that the important factors in the economy which made it possible to develop such an instrument still exist.

Another criticism of the use of mechanical devices is that the practice involves acceptance of a deceptive simplification in theory. This is a common error to be found in much so-called scientific theory and also exists in a large part of the social theory fashionable today. When a man is able to understand and define some new aspect of truth, he finds it natural to think that his theory is the outstanding truth of all time. Discrepancies tend to be ignored, and in this way it becomes possible to formulate an all-embracing simple explanation which can be the key to understanding practically everything. As yet the social scientists lack means by which to deal with the incomprehensible number of variables which affect social life. This would still be true even if it were possible to obtain accurate mathematical measurements for the variables concerned. An attempt to resolve this problem by using the technique of multiple correlation is not an adequate solution, because of difficulty experienced either in obtaining precise measurements or in dealing with more than two or three independent variables.

A further unfavorable criticism, applying particularly to the use of barometric devices, is that they generally are difficult to interpret and seldom indicate a change in economic weather early enough to allow adjustment to be made by business management.

### NEW PRODUCT PROFITS

One mechanical device which has been found useful was developed as a result of curiosity concerning how long it would be after the introduction of a new product before profits might be expected. By grouping products into logical classes, it was found that the length of time it ordinarily takes to obtain a continued profit from a new product, and the length of time which ordinarily elapses after a profit has first been made and before operating losses sustained during the introductory period are equaled by accumulated profits, may be determined with a sur-

prising degree of attendant probability. In these studies commodities should be classified by types of market, the relation of the item to commodities now manufactured or sold, and the degree to which the market for the product has been developed. This type of product classification is described in Chapter XIV. When studies of this type were first undertaken in the Armstrong Cork Company, it was expected that the status of general economic conditions would be more important in the matter of determining when profits were first obtained from a new product than the length of time needed to perfect a commodity and gain adequate market acceptance. This, however, was not the case. Apparently some new products can be introduced to the market during a severe depression and be brought to a profitable level before general economic recovery occurs. In the experience of the Armstrong Cork Company, one product which was first manufactured in the mid-'20's was not made profitable until 1931. There was no reason to believe that the demand for the product was increased by the existence of depression conditions.

After a new product has been introduced to the market, the technique of using a calculation based on analogy can be employed to estimate the long-term growth of demand. If a statistician is in a position to use records of sales following the introduction of a number of new products, he may establish standard acceptance trends for different types of commodities by averaging results obtained in the past. It will be found that the demand for some types of products may be developed much more rapidly than that for other types of commodities. If a product is already well known to customers, the progress made in developing acceptance will be slow unless the company selling the commodity possesses advantages which competitors do not have. Frequently the demand for a new product is increased at a rate which is related to the eventual magnitude of the market. In some instances it will be found possible to estimate the eventual sales of a product by using arithmetic probability graph paper. In most cases, however, the use of curves developed by averaging experience with similar products will be found more useful.

Although mechanical forecasting devices used unintelligently are practically worthless, a knowledge of these instruments is

useful in the practice of forecasting. Time spent in studying devices which may be used in forecasting facilitates the development of an understanding of the factors and forces which cause changes in the expectations of managers and consumers. When the use of mechanical devices is combined with critical analysis, it is possible to forecast sales and profits with the highest degree of precision attainable.

## CHAPTER XII

### PRICE FORECASTING

Probably prices and the price system are among the most remarkable inventions which are commonly taken for granted. It is truly remarkable how few persons apparently recognize that prices and price relationships are the means by which production and consumption actually are guided and regulated in an economy where profit is derived from effort organized to create the commodities which people want.

There seems to be almost no expedient designed to manipulate, impede, and distort the operation of the price system which will not be espoused by some important segment of the population. In fact, it appears to be the habit of people living in an organized society to prolong and intensify both depressions and inflationary booms by tinkering with the price mechanism. Generally these efforts take the form of experimentation with the currency—although political coercion as well as subsidies, tariffs, taxes, and force are but a few among a variety of other devices employed to defer or prevent a natural integration of prices. The existence of this situation affects the well-being and wealth of the Nation, and is an important factor to be borne in mind, when one is forecasting prices.

Prices represent the quantity of money which vendors will accept and buyers will pay in exchanging money for commodities.

A preliminary step to be taken in the process of forecasting the trend of prices is the development of a comprehensive "estimate of the economic situation." Among the factors to be considered in the estimate are the status of the tensions existing in the economy; the probable magnitude and timing of expansion or contraction in the money supply; and the estimated change in the use of the available money supply, based on the status of expectations held and probably to be held by the political administration, managers of private enterprise, consumers, employees, and investors. Other important elements are the final conclusions

concerning the probable level and pattern of change to be expected in the general price level.

### PRICE INTEGRATION

Valid conclusions concerning the probable status of the future general price level are essential, because, in the operation of the economy, the prices of particular commodities tend to be integrated with the prices charged for a large number of other products. A change in the price paid for the services of employees in any important industry will affect the prices of rubber, ice cream, and writing paper—which at first glance appear to have little in common. Although a change in the price of one product affects the price of all other commodities, there are differences to be considered in respect to the relative economic importance of different prices and commodities. Moreover, it must be recognized that there are numerous frictions, maladjustments, and special circumstances which affect the perfection with which commodity prices are integrated in the ceaseless adjustment being effected within the price structure. Thus, although it is imperative to possess an understanding of the levels and patterns of change to be anticipated in the trend of prices in the economy, these concepts should be used as an abstract or generalized comprehension of the environment in which various particular factors will cause changes in the prices of individual commodities.

### GENERAL LEVEL OF PRICES

Although it seems to be reasonable to think in terms of a "general price level," it is difficult to obtain an accurate statistical measurement of the general current level of prices as compared with the level at some other period of time. The existing comprehensive price indexes, such as the index of wholesale prices computed by the United States Bureau of Labor Statistics, are not accurate measures of the general price level. Wholesale price indexes are heavily weighted with raw material prices and apparently are much more volatile than would be an index of the general price level. Probably the cost of living indexes are the most comprehensive price measurements available at the present, yet these indexes were designed to measure changes in prices

paid by low income recipients for the commodities included in their annual budgets. Obviously there are many prices which are not covered by such compilations.

Changes in the general level of prices are caused by variations in the prices of securities, real estate, and taxes paid by businesses as well as by fluctuations in the prices paid for commodities and services. Consequently, it is apparent that an actual index of the general price level would include measurements of changes in the market prices of securities, commodities, services, and property of all kinds. Such an index is not available. The calculation of this kind of index presumably would require the use of shifting weights, with the result that it would be very difficult to understand what the index actually represented after it had been computed. Thus, in lieu of a statistical measurement of the general price level, the economist is obliged to think largely in terms of a general "tendency" for prices to be increased or to be reduced; whereas differences in the magnitude of change often are indicated by using adverbs. In practice, it is customary to state that the general price level will be increased or reduced "substantially," "moderately," "rapidly," or "slowly." Specific magnitudes generally are mentioned only in dealing with particular prices or price indexes.

One means of dealing with the general price level is to consider that it may be measured by the magnitude of change occurring in estimates of national income, or gross national product, due to change in prices rather than to a change in the unit volume of production. This approach to measurement of apparent change in the general price level involves the use of some means of deflating national income. Deflation of the components of national income by appropriate price indexes has been attempted by the Department of Commerce, and estimates for past years have been reported from time to time in terms of constant dollars. It will be found that approximately the same results can be obtained by deflating statistics of national income by means of an index of the cost of living. This experience leads to the conclusion that, for some purposes, the cost of living may be used as a measure of the general price level and that the approximate amount of change in national income, due to price variation, can be measured by using an index of the cost of living.

When variation in national income due to price fluctuation is

treated as a measurement of change in the general price level, it is obvious that changes in the market prices of securities and real estate, among other things, are not taken into consideration. Thus it is apparent that such figures actually are not an accurate representation of the concept of a general price level for all purposes.

### PRICE TREND FORECASTS

If it is conceded that the cost of living generally represents an approximation of the general price level and that changes in the level of national income due to price often can be estimated by using this price index, it becomes possible to estimate the approximate magnitude of wide variations to be expected in the general price level by the following technique. An estimate of the future money supply (Table XII, page 70) is multiplied by an estimate of the future "indicated use of money" (page 53). By this means an approximation of national income is obtained in terms of future prices. By estimating the future unit volume of production in terms of national income in constant dollars, an indication of the approximate probable magnitude of change in the price level may be derived. As may be seen, this technique involves using a large number of estimates, of which any one may be in error because of faulty judgment. Consequently, this method of estimating the magnitude of a future change in the general price level should be used with caution. In practice, the technique is particularly useful as a means of understanding what would be involved if an estimated change in the general price level should be developed. Actually it will be found that, by using the procedure described, a useful appreciation of the probable magnitude of change in the general price level can be developed at those times when it is most necessary.

### PRICE CLASSIFICATION

Although it is essential to develop an understanding of the probable trend of prices in general as a preliminary step in the process of forecasting particular prices, it is helpful to deal with the general price structure in terms of types of prices differentiated by managerial interest. The various prices which

are considered in managing a business may be separated into the following five major categories:

1. Prices paid for the services of employees.
2. Prices paid for raw materials.
3. Prices obtained for commodities sold.
4. Prices of corporate equities.
5. Prices of borrowed capital.

The first two categories represent the prices of the major cost items of a business and largely determine, for the short term, how much it will cost to produce commodities in an established enterprise. The difference between the aggregate of cost prices and the total of selling prices largely determines the magnitude of the gross profit margin, and the prospect of change in this relationship affects managerial expectations and business practice.

### PRICE OF EMPLOYEE SERVICES

We commonly refer to the price of the services of employees paid on an hourly basis by using the words "wage rates." By the use of this specialized term, the fact that wage rates really are prices frequently is clouded in much of the discussion concerning the remuneration of wage earners. This peculiarity of phrasing is a source of considerable misunderstanding and confusion in public discussion of the relationship of wage rates to the selling prices of goods produced, the scale of living, and the effects of changes in wage rates on economic activity. Even among those who understand that wage rates are prices for services, the relationship between prices of finished products and prices in the form of wage rates frequently is obscured. Those who wish to deceive themselves find it possible to think that increases in wage rates are not the causes of corresponding advances in the prices of commodities produced with the services of labor, owing to the supposition that improvement in technology or volume of sales involved will provide offsets to an advance in wages. Although it is true that an increase in labor efficiency due to improvement in technology or an increase in volume may offset an increase in wage rates, such an adjustment may not be possible in a particular business. When there is a general upward move-



ment of wage rates in the economy, many businesses are not able to offset a general increase in the price of wage earners' services by technological improvement or increased volume during the short term. The result is that the general price level is increased as selling prices rise.

It is particularly important to know about the kind and magnitude of changes in wage rates and finished commodity prices in the economy as a whole. As in many other situations which must be analyzed by the economist, wage rates and finished commodity prices are mutual determinants over the short term. Each type of price affects the other. If wages are increased, the prices of the products produced by labor are increased; and, if the general price level is increased, there is pressure for higher wages.

Unfortunately the relationship between wage rates and finished commodity prices in the economy cannot be measured with precision. One inadequate but useful statistical computation which can be developed for this purpose is the relationship of an index of finished product prices to an index representing a measurement of the cost of labor per unit of output. Yet precise figures cannot be obtained covering the situation for all wage rates and all production. At the present time a satisfactory substitute for more adequate data may be obtained by computing an approximation of the cost of labor per unit of production in industry. This may be accomplished by dividing the index of wage-earner payrolls in all manufacturing (reported by the United States Bureau of Labor Statistics) by the index of industrial production (reported by the Federal Reserve Board). For practical purposes, it is immaterial whether or not the index of production in manufacturing is used or the index of industrial production. This index of the cost of labor per unit of production can be calculated on both a monthly and an annual basis.

It is to be noted that the values derived for the cost of labor per unit of output described are determined not only by the prices charged for the services of labor but also by the efficiency of labor, the assortment of commodities, and technology. By studying the relationship of changes in wage rates versus changes in hours worked, an appreciation of the effect of variation in these two factors on the values reported in the payroll series may be obtained. It will be found that variations due to assort-

ment, efficiency, and changes in technology tend to be of minor importance over short periods of time. Despite the broad coverage of the component series used in these calculations, and even though some companies report figures for one index but do not furnish data for the other, this means of measuring changes in the cost of labor per unit of output has yielded satisfactory if not precise results.

When the calculated index of the cost of labor per unit of output is compared with the index of the wholesale prices of finished products, it may be observed that most of the time both the trend and approximate change in one series is duplicated by similar movements in the other. During the war years this means of measuring the relationship between labor cost and selling prices did not yield satisfactory results, because the prices of many military products were not included in the price index, while the high wages paid munitions workers were included as a part of the labor cost series. It is to be expected, however, that an examination of the relationship between these indexes will be useful for forecasting purposes in future years.

In instances where the general level of prices is being increased and it is anticipated that prices will continue to be firm or to rise for some time to come, an increase in the prices paid for the services of wage earners may be expected to continue and to accelerate the rise in the general price level. Conversely, when prices decline and wages are reduced, the decline in prices is accelerated if it is expected that prices will continue to be reduced. A decline in wage rates, when the general price level is considered to be low, may be expected to facilitate a reversal of the general decline in prices and initiate a recovery movement in which consumption, production, and employment will be increased.

Although an economist should be in a position to provide production management with information concerning the general trends which are to be expected in regard to wage rates on a national basis, actual forecasts of the wage rates to be paid by a particular company should be made by the management responsible for wage and salary administration.

Salaries also represent prices paid for the services of employees. Unfortunately the available data on salaries leaves much to be desired. It may be observed, however, that salaries tend to rise or fall when wage rates are either increased or reduced. In

most businesses an attempt is made to adjust salaries at those times when changes are made in wage rates. Over a long period of time, wage payments as a proportion of national income and wage payments as a proportion of the gross income of manufacturing enterprise have tended to remain stable. It also may be observed that salaries have been somewhat more stable than wages. From this evidence it may be concluded that salaries tend to rise and fall with changes in wage rates but that there is a somewhat smaller percentagewise fluctuation in the former.

### RAW MATERIAL PRICES

As in the procedure followed in forecasting wage rates, the task of estimating future raw material prices should begin with an estimate of the trend to be expected in the general price level. It will be found that over a period of six months to a year most raw material prices will either rise or decline simultaneously. With conclusions concerning the general price situation provided, a detailed study should be made concerning the particular influences which presumably will affect individual commodity prices. It is to be noted, however, that it is bad practice to develop an estimate of the trend of prices for a particular product without considering the general price situation to be the environment in which the commodity will be produced and sold.

In forecasting the general trend of raw material prices, it is helpful to be familiar with short-term fluctuations developed in sensitive commodity prices. One excellent index available for this purpose is the weekly series reported by the United States Bureau of Labor Statistics covering 28 basic commodities. Fisher's Index is another series commonly used. Particular attention should be paid to the short-term movement of the prices of those commodities for which the volume of supply is comparatively stable relative to the variations which occur in demand. The prices of tin, steel scrap, hides, rubber, cotton, and copper generally are useful for the purposes of estimating changes in respect to managerial expectations, because the demand over the short term for these products often is more volatile than the supply.

There is no universal method which can be recommended as a means of forecasting the price of particular raw materials

unless it may be said that factors which determine the supply of and the demand for particular commodities must be known and studied in detail.

In estimating the probable supply of a specific product, it should be remembered that the cost price of a buyer is the selling price of the supplier, and that the cost prices of the supplier affect both the selling prices asked and the volume of supply. Consequently, it may be seen that changes in the prices paid for the services of employees by a supplier of raw materials cause changes in the selling prices of the commodities which are made of such raw materials. Frequently an increase in material prices due to a change in wage rates is carried through to the ultimate consumer.

Generally the demand for a raw material is not determined by the purchases of any one company and seldom by the demand of the members of any one industry. Therefore, in estimating the aggregate demand for an important raw material used by a company, it is essential to make a comprehensive estimate of consumption by correlating past usage of the product with total activity in consuming industries. In some instances it will be found that specific raw materials are used in so many businesses that the demand for such commodities can be estimated with reasonable accuracy by correlating past usage of the product with national income, industrial production, disposable income, or other comprehensive measurements of activity on a national basis.

Although the economist should be in a position to understand the general trend of prices in the economy and should be familiar with the current and probable status of the important environmental factors which will determine the price of a raw material, his judgments should be developed for the purpose of advising the management actually performing the purchasing function. Experienced purchasing men are in a position to obtain and use much specialized information which the economist should not even attempt to develop. Furthermore, the purchasing management must accept responsibility for commitments. Consequently, although the economist may provide the purchasing department with pertinent information, the forecasts of raw material prices to be used in making an operating budget should be established by the purchasing management.

### SELLING PRICES

Selling prices may be forecast by considering the situation in respect to the probable cost of manufacturing and merchandising, the competitive position of the business in the industry, the competitive position of the industry in the economy, the prospective volume of demand, and the profit desired or possible.

Manufacturing costs incurred by a company are determined by analyzing the situation in terms of changes to be expected in wage rates, raw material and equipment prices, and the efficiency with which the production management probably will be able to utilize labor, material, and equipment in producing salable merchandise. In these calculations the probable volume of sales finally must be taken into consideration to determine the per unit charge to be made to cover depreciation, obsolescence, and fixed costs.

The costs of distribution are determined by the expense involved in conducting merchandising operations. In estimating the probable magnitude of selling costs, it is essential to be familiar with the situation in respect to the competitive position of the business and the action which is to be taken to obtain the maximum economic volume of sales. In evaluating selling costs, it is to be stressed that the quantity of money spent does not determine the effectiveness of merchandising effort. There are qualitative as well as quantitative differences to be considered. As a result, estimates of the expenditure necessary to distribute goods in competition with other companies must be determined largely by a sales management which is responsible for the strategic and tactical planning and performance of the merchandising function.

The competitive position of a business largely determines whether or not a company actually can establish the selling price of a product. It is obvious that the companies in an industry which are able to produce and distribute most efficiently are in a position to enjoy the largest profit margins obtainable by any of the enterprises with which they compete. Because efficient companies are profitable when marginal businesses are losing capital, the management of the low-cost companies may be said to be in a position to exercise a measure of control over the selling prices of the entire industry. Consequently, it is imperative to know which companies in an industry probably will be in a

position to operate most efficiently. In a business, which by virtue of efficiency exercises a measure of control over the selling prices in an industry, the management must determine what pricing policy will be followed with the objects of maximizing profit, obtaining an economic volume of sales, and securing the competitive position of the enterprise. In well managed companies these policies are carefully determined and are used in the processes of planning and forecasting.

If a commodity is sold in competition with the products of other industries, as is the case when several different products can be used by customers for approximately the same purpose, the optimum relation between the price of a product and the price of a substitute must be determined in order to forecast or establish an economic selling price. In some businesses it may be found that the price of the product is not wholly determinable by either the management of a company or the other companies in an industry, but it is established by the members of a completely different industry who offer substitutes for the commodity involved. In such an instance customers will tend to purchase the substitute product if the price of the commodity in the business under consideration is increased to the point where the substitute is considered to be the better buy.

After the apparent probable situation in respect to costs and competitive relationships has been determined, reasonable estimates of the volume of demand at different selling prices can be calculated. After a proper analysis of the probable magnitude of profit to be obtained with different feasible selling prices, the price, volume, and profit expectancies can be established for use in managing operations.

It is commonly thought that the volume of sales obtained for a product will be increased if the selling price of the commodity is reduced. Over the long term this actually is what occurs. One may find numerous illustrations of the fact that an increase in consumption may be brought about by reducing prices. But it also is true that price reduction may cause potential customers to defer purchases over the short term, even though sales will be increased in the long run. If customers expect prices to be further reduced and are in a position to defer the purchase of a product, a temporary decrease in sales may be precipitated by the announcement of a price cut. Customers who carry goods on

inventory are particularly apt to reduce their orders when the general price level is subject to decline, because price cuts cause inventory loss. During a general recession in business activity, failure to reduce the selling prices of goods or services will tend to prolong the period during which depression conditions are experienced. Yet price reductions tend to intensify a recession by causing customers to defer their purchases. In view of these circumstances, it is to be expected that a decline in selling prices will be continued during a major recession in business until the general level of prices has been reduced to a point at which many individuals are induced to increase their purchases of commodities by a belief that prices are low and will rise. But it is not to be expected that a reduction in selling prices will stimulate sales until customers conclude that prices probably will not be further reduced.

When forecasting the price of a new product or making long-term estimates of selling prices with the object of estimating the volume of profits to be obtained, it is imperative to integrate cost prices with the final selling prices concerned. The common practice of using standard costs in profit estimating may lead to the establishment of forecasts which are misleading because the cost prices are not properly integrated with the estimated selling price. When forecasting either the selling price of a product new to a business or the selling price of a commodity over the long term, it is necessary to establish the cost prices involved as a first step. Then, by employing an appropriate mark-up, which may be determined by a review of actual experience, it is possible to establish a proper estimated selling price relative to the assumed level of cost prices. In this way the danger of making a misleading forecast in which cost prices are calculated on a low basis and selling prices on a high level is minimized. If this practice is not followed, it is easy to assume that large profits will be obtained from certain operations and subsequently find that profits were greatly overestimated.

### EQUITY PRICES

The market prices of corporate equities are important to management for two reasons. First, movements in common stock prices represent one of the best means of measuring changes in the expectations of managers, consumers, and sophisticated stu-

dents of the business situation. Second, the level of equity prices determines whether or not representative business in the economy is in a position to finance the purchase of new capital assets by selling common stock.

By the purchase of a quantity of common stock, a definite share of the assets of a business becomes the property of an investor. The owner of corporate equities is entitled to a share of the profits obtained from the use of his property and assumes the risks of ownership, which may involve either a partial or total loss of his property. Consequently, it may be said that the market price of common stock reflects the valuation that investors place on the ownership of corporate assets.

When it is commonly expected that economic activity and profits will be expanded, business property is considered to be more valuable, with a result that the market price of common stock is increased. Conversely, if it is commonly anticipated that the volume of trade, or the profits obtained from business activity, will be lowered, equity prices are reduced. The price of individual corporate equities may be subject to the influence of circumstances peculiar to the current market for the securities of the particular enterprise; and, at frequent intervals, the equity market as a whole is subject to important but temporary stresses and maladjustments. Yet, most of the time, it is the investors' valuation of the prospects for a business and of possession of a right to the profits derived from the use of such property which is an underlying determinant of the market price of a common stock. Thus, the task of forecasting common stock prices and the use of equity prices as a means of assessing the nature of changes in investor expectations involves a continual analysis of the movement of security prices with the object of differentiating between short-term fluctuations and continued trends.

There are two important groups of investors, among others, who largely determine the level of market prices for common stock. These two classes may be differentiated by the way in which they approach the problem of investment and the factors which they consider in arriving at their judgments.

In the first category are the "sophisticated" investors. Individuals in this group study the current and prospective yield of the securities which they buy. Often they make comprehensive estimates of the probable economic situation in the future and



base their actions on carefully considered original judgments. In some instances the ratios between holdings of obligations, cash, and common stocks are varied according to the disequilibria which are considered to exist in the security markets. When common stocks are thought to be high and yields low relative to the risk involved, funds are shifted from stocks to government obligations, high-grade bonds, and cash. When equity prices are considered to be low and yields are high, funds are placed in equities. Experience with this type of investor indicates that they are interested in buying the equities of well managed companies in a position to produce goods and services for which there is an expanding demand. By virtue of the activities of sophisticated investors, capital is directed to those enterprises which appear to be best able to provide the commodities wanted by customers.

A second important group of investors is composed of naïve persons who hope to use the security markets as a means of getting rich with little effort. These persons seldom make a careful analysis of the prospects for the companies in which they buy a share. Frequently their sole information is third- or fourth-hand "tips," which may be founded on hope at the best. A major interest of this type of investor is to purchase an equity which will appreciate in market value, with the object of unloading the securities on someone who is not so intelligent as the buyer. Glamour stocks, the equities of companies with well known names, "good" stocks, and securities selling for a few dollars a share generally are the instruments selected by this type of speculator. A majority of these people speculate on an intermittent basis over the course of the business cycle. It is only after prices have risen substantially that they become most interested in purchasing equities. Then an appreciation of the fact that profits could have been made by buying securities in the past develops an interest in speculation. Thus, after the market has risen to a high level, unsophisticated speculators become most eager to trade in securities. When the market has been subject to their attentions for an extended period of time, prices are driven to a point where yields are low and market values are high relative to the level of equilibrium. This situation precedes a recession in market prices, deflation of the general level of expectations, and a reduction in the volume of national output.

When studied in connection with other factors, a measurement of the state of disequilibrium in equity prices may be a useful instrument for the purpose of forecasting business activity. A condition of disequilibrium is evident when investors are willing to pay much more, or much less, than the prices which ordinarily would prevail on the basis of current and prospective earnings, book values, and yields.

For many years the price-earnings ratio has been used as a means of calculating the value of an equity in view of current and prospective earnings. It may be observed, however, that the size of an enterprise, the stability and growth of the business, the book value of the assets, and the yield to be obtained also are important factors which affect the price-earnings ratio of a given stock. As a result, the most practical mathematical measurement of the value of a common share involves a recognition of factors other than the price-earnings ratio alone. One means by which book value and earnings in combination can be used to determine value is described in the following paragraph.

The past prices of an equity are integrated with the earnings per share and book value for as long a period as statistics are obtainable—preferably a decade or more. An average annual price is used which may be either an arithmetic average of the monthly highs and lows of the stock, or a price which is calculated by other and more precise methods. The average price is related to earnings and book value by the process of multiple correlation to obtain an equation. An estimate of the prospective earnings of a company and an estimate of the probable book value per share may be introduced into the equation; and, when the equation is completed, the equilibrium value is indicated. The deviation of the market price from the indicated equilibrium price is a measurement of the extent to which the equity is under- or over-valued in terms of current market prices. When the equilibrium values for a comprehensive list of stocks are combined, an estimate of the combined current equilibrium level of the securities may be obtained. The deviation of the average of market prices for the list of stocks from the calculated combined equilibrium level is indicative of the amount of disequilibrium in the market.

It is important to realize that it is necessary to make reasonable estimates of the earnings to be reported by different enterprises before it is possible to use the technique described in the foregoing

paragraph. Consequently, it is evident that the person employing such a device must be an experienced speculator competent to make reasonable judgments before the technique can be used with either confidence or profit.

The calculation of the equations required is a laborious and expensive process. If it is not considered desirable to compute a large number of equations, the data may be purchased from a commercial service which provides information of this kind.

### INTEREST RATES

Interest rates are the prices charged for borrowed capital. Because borrowed money represents a large proportion of the capital employed in some forms of productive activity, changes in interest rates affect the level of national output. In an economy where interest rates reflect the natural relationship between the supply of and demand for credit, an increase in interest rates tends to defer the undertaking of marginal business ventures. Contrariwise, a decrease in naturally adjusted interest rates tends to stimulate economic adventure. Interest rates, however, are not the sole determinants of the volume and trend of business activity; and, although the price of borrowed money is an important component of cost in many business situations—particularly construction—there are other factors which must be considered.

For many decades in this country, interest rates were largely determined by the relation between bank reserves, and bank loans and investments. In past years when the earning assets of banks were increased to the maximum considered safe or allowable in view of existing reserves, interest rates were increased, with the result that many new, unsound, or marginal business ventures were deferred or liquidated. During recessions in economic activity, loans were paid off and savings accumulated, so that the earning assets of banks were reduced, relative to reserves. After commercial bankers again found their reserves adequate to permit expansion of loans and investments, interest rates were reduced in a competitive effort to increase earning assets. When interest charges were reduced, capital was borrowed to take advantage of bargain prices for commodities and services, with the result that recovery was generated.

After the development of the Federal Reserve System and the wartime expansion of government debt, interest rates no longer have been determined by a natural adjustment of the supply of capital to the demand for borrowed money. As this is being written, it is clearly evident that the largest borrower of capital, namely, the Federal Government, is determining what the interest rate will be by virtue of the influence which the officials of the Federal Treasury exercise over the operations of the Federal Reserve Banks. At the present time it may be said that the level of interest rates for government obligations is being determined by the debtor. How long this situation will continue to exist is not precisely determinable.

A second development which reduced the importance of interest rates as a means of checking extreme fluctuations in economic activity occurred during the 1920's. At that time established corporations reduced their dependence on commercial banks by acquiring working capital from the public through the sale of common stock. Prior to World War I it was customary for many business enterprises to borrow the working capital used for financing inventories and accounts receivable. In the First World War the public was educated by the Government to the practice of investing savings in securities. This was one important effect of the Liberty Bond drives in World War I. Subsequently, during the prosperous period of the '20's, many individuals in the economic middle class, who formerly would have used their savings to buy mortgages or who would have deposited them in savings banks, considered it advantageous to invest their excess funds in corporate securities. With a broadened market for industrial securities, there was a widespread tendency on the part of corporation management to obtain working capital from the public rather than from commercial banks. One later result of this development has been that a larger proportion of the earnings and assets of commercial banks has been represented by investments rather than loans; and, during recent years, government bonds have been the major medium used for bank investment.

Since the Federal Government acquired a position in which the political authorities can determine the level of interest rates for an indefinite period, the task of forecasting future trends and changes in the structure of interest rates depends on the accuracy with which the pressures on, and actions of, the political authori-

ties can be foreseen. Consequently, the objectives and policies of voters, legislators, and officials charged with responsibility for financing government operations must be considered.

It is reasonable to assume that the officials in the Federal Treasury will be interested in dominating reserve bank policy in order to control the volume and price of government obligations held by commercial banks. At the same time, these authorities will be interested in minimizing federal expenditure in the form of interest payments on the public debt. To this end the needs and desires of current and potential owners of government securities will continue to be carefully surveyed, so that appropriate instruments may be developed for sale to every market for government obligations. Consequently, new types of obligations probably will be introduced from time to time.

Members of Congress will be interested in minimizing the taxes which must be imposed on their constituents in order to obtain funds with which to service the federal debt. This objective will lead to constant pressure on Treasury officials to minimize the amount of money paid as interest on the public debt.

The public, as usual, will wish to pay as little as possible in the form of taxes and receive as much as possible in the way of bonuses, subsidies, pensions, relief, and other forms of federal expenditure which directly benefit certain pressure groups.

In conclusion, it may be stated that interest rates will be determined by a complex of forces generated by the relationship between the general supply of capital and demand for funds; conditions in the commercial money market where business is financed; and action by the Government.

## CHAPTER XIII

### TURNING POINTS IN SALES AND PROFITS

Turning points in the sales and profits of a well managed established business occur when the trend of demand for the products sold is reversed. The important turning points experienced by the management of an enterprise selling in a national market occur when the cyclical trend of national output is changed. The high point in a boom in national economic activity immediately preceding a recession is a turning point sometimes called a "crisis." The period in which depression conditions are changed to those of the beginning of recovery is a turning point which is eagerly anticipated by almost everyone and ordinarily is recognized long after it has occurred. In fact turning points in the tides of economic activity generally are not widely understood for what they are until such developments have become history.

Probable and possible turning points are an important part of any forecast of business conditions. A forecast of the pattern of business activity consists of a series of expected turning points. In fact, a long-term forecast in which no consideration is given to the probable turning points of the fluctuations in national output may be considered to be invalid merely because allowance has not been made for such developments. Actually there seldom are three consecutive years in which the trend of national output is not reversed at least once, and in almost any four-year period two important reversals in the trend of activity may be observed.

Useful forecasts of turning points in the national activity over the long term are formulated by consideration of conditions in situations yet to be developed in the economy. All the knowledge of human tendencies and economic behavior that can be had; all the devices and resources available for the purposes of the economist, such as standard periodicities, statistical measurements and models; and the judgments of professional acquaintances are taxed in an attempt to foresee the time at which the trend of business activity may be reversed.

Possession of a comprehensive long-term forecast, however, is essential in the process of developing a useful short-term estimate. If there is good reason to believe, at a certain time, that no great continued recession in business activity is to be experienced for several years to come, the beginning of a decline in national output is considered to be of different importance than if it is thought that a major depression is imminent. Nor is every minor rise in economic activity during a general recession in activity necessarily the beginning of a recovery movement. In order for one to be in a position to assess the importance of short-term movements in economic activity, the perspective established by possession of a reasonable long-term forecast is essential.

Turning points in neither the short-term nor the long-term future can be forecast exactly and with certainty. About the best performance to be expected in this respect is to understand approximately when such changes may be anticipated and under what conditions. Yet this limited knowledge is invaluable. By being forewarned of the possible imminence of a reversal in the trend of economic activity, the economist's attention is directed to a search for evidence of the kind of critical situation which is found prior to a turning point in trade. Events, opinions, trends, and situations in the economy are accorded a different meaning when it is apparent that a reversal in the trend of business activity soon may be experienced.

When there is reason to think that such a situation is being developed, evidence is to be sought indicating the kind of expectations held by prudent managers. Do such persons expect that profits will be reduced in the near future? Are managers worried about the possible effects of a minor decline in sales volume?

The expectations of managers are most revealing when considered in conjunction with estimates of the disequilibria to be observed in the price level, the volume of national output, equity prices, consumer indebtedness, and activity in important industries.

Evidence of disorganization in the economy exists in the form of maladjustments within the supply of commodities offered for sale. Although measurements of aggregate inventories may not indicate the presence of a supply of commodities in excess of demand, it may be found that inventories of some types of consumers' durable goods are being accumulated by distributors.

During a depression inventories of raw materials may be enormous; yet inventories of finished durable goods may be relatively small just before a recovery movement is originated. In considering the effect of inventories on expectations and the trend of trade, the assortment of supplies of commodities offered for sale generally is of more importance than the magnitude of the aggregate of stocks.

The relation of department store inventories to sales is worthy of careful study when a cyclical decline in economic activity is considered to be a reasonable possibility. Both of the figures used in calculating a ratio series employed in measuring this relationship are reported in the *Survey of Current Business* on a monthly basis.

The magnitude of consumer stocks of durable commodities also is to be considered when a cyclical turning point is anticipated. When inventories of deferrable goods in the hands of consumers are high and consumer indebtedness is well above the level of equilibrium, a spiral of deflation may be precipitated without much warning. When the situation in respect to inventories and indebtedness is reversed, a rising level of trade and production may be developed by events which cause astute consumers and managers to adopt more optimistic expectations.

An important recession in economic activity may be preceded by a situation in which it is evident that excess productive capacity has been developed in a number of important industries. As in the case of inventories, excess capacity may not be apparent in the aggregate before a general decline in trade is precipitated. If, however, in the operation of a number of industries which have been prosperous, and in which the management has been increasing capacity rapidly, it becomes apparent that expansion-minded executives have been too optimistic regarding the market, intensified competition for trade may lead to price wars and pessimistic managerial expectations. Although there is no reason to assume that any particular industry is more subject to the development of excess capacity than any other—because this depends on the skill with which the various enterprises in an industry are managed—yet particular attention should be paid to the relationship of capacity to market in important industries in which durable goods are produced.

One of the most serious maladjustments which precedes a con-



tinued recession in business activity occurs when residential construction has been increased and continued to the point where more dwelling units have been produced than can be absorbed by the market. Because the construction industry is such an important source of income for so many consumers, an oversupply of buildings presages a recession in national output of major proportions. On the other hand, a period of national prosperity may be foreseen when it is apparent that there will be an effective demand for an increased number of dwelling units for some years in the future. Consequently, it will be found that a large part of the success experienced in the practice of business forecasting may be attributed to competent analysis of the situation in, and outlook for, the construction industry, with particular emphasis on privately financed residential construction.

Businessmen develop pessimistic expectations regarding the outlook for profits owing to one or more of the following causes: Rapidly increasing labor costs which cannot be offset by increases either in selling prices, or advances in technology, or immediate increases in volume; rapidly increasing raw material prices when offsetting factors are not apparent; and a condition in which interest rates are increased to a level at which numerous marginal ventures are deferred, abandoned, or liquidated.

Statistical series designed to measure monthly change in the cost of labor per unit of production are particularly useful in forecasting turning points in productive activity (see page 114). When competition is intense and manufacturing costs are being augmented by increases in the labor cost per unit of production in large segments of industry, it is to be assumed that managerial expectations will be changed to those of a pessimistic nature, with the result that a deflationary spiral will be originated.

Likewise a rapid increase in raw material costs accompanied by rising labor costs may precipitate a recession in productive activity if national output is well above the level of equilibrium.

When the economic situation is of such a nature that a decline in the trend of economic activity is to be expected, and it is apparent that the expectations of astute and prudent managers are being changed, events which would not have been considered unduly alarming in previous months are viewed as being calamities of the first magnitude. At such a time many individuals acting as managers or consumers are worried about future eco-

conomic conditions and are led to reduce whatever risks may be involved in inventories of commodities, ownership of equities, expenditure of income or capital, or other economic activity which was undertaken for the purpose of making a profit but which apparently may result in loss.

When a recession in business activity has been underway for an extended period of time and it is evident that a reversal of the trend is imminent, the first definite signs of recovery occur when shrewd businessmen take a longer position in speculative commodities and sophisticated investors begin to purchase securities at the low prices then obtaining.

The first step taken by buyers of speculative raw materials at the beginning of recovery is to cover estimated usage for a longer period of time. This may take the form of placing contracts for delivery in the more distant future; or, when storage facilities are available, larger quantities of raw materials may be bought for immediate delivery. In either case, the result is an increase in the demand for raw materials relative to the supply, with a result that prices first are firmed and then are increased.

Stock market prices may be employed as exceptionally sensitive instruments for measuring the effect of events on the expectations of persons who are highly interested in the trend of business activity and the magnitude of profits. Consequently, the effect of developments in the news on equity prices is to be studied with great care when a reversal in business activity appears to be at hand. In this connection it is to be noted that the character of news does not necessarily determine the trend of equity prices. Not infrequently "good" news may apparently precipitate a decline in market prices. When this happens it sometimes is said that the favorable information was discounted by astute persons before the news was generally available. Another interpretation of such a situation is that an important number of persons anticipated that the market would decline at some time in the near future and considered that the publication of favorable news offered them the best foreseeable opportunity to dispose of their holdings. Once a recession in prices of general proportions is begun, there is a common tendency to consider that all news is discouraging. In this way a decline in market prices is extended. Because of these tendencies on the part of investors, it sometimes is said that the news "favors" the trend.

When the market is rising, events are interpreted as being "good," and during a decline in equity prices news is "bad."

When it is thought that a major reversal in the trend of production and trade is imminent, it is of particular importance to be well informed concerning the expectations and policies of investors, speculators, and persons gambling in the stock market. Pertinent information consists of a knowledge of price changes in relation to news, profit estimates made by competent investors, profit estimates made by well-informed managers of industrial and commercial corporations, a knowledge of the types of securities which appear to be most interesting to speculators and investors at the time, the disequilibria in the market, etc. Exceedingly important is a knowledge of expectations which will not be realized but which will be changed in the future.

Not infrequently a forewarning of a coming major decline in equity prices may be observed when sophisticated investors liquidate holdings of high-quality equities and invest the proceeds in high-grade bonds, or sell "speculative" stocks and purchase "investment" quality equities, or accumulate cash during a period when there is a large volume of trading in the market and it is commonly anticipated that stock prices will continue to be increased.

When an important recession in national output has been experienced and equity prices are low relative to earnings and book values, one of the first signs of recovery may be observed when astute investors begin to accumulate bonds and common stocks. Accurate information concerning the practices of such investors is not bruited about, owing to the fact that intelligent men generally consider what they may do in respect to investing their capital is their own business. So sensitive, however, are security prices to changes in the relationship between demand and supply that no considerable sums of money can be introduced into, or withdrawn from, the security market without leaving evidence which may be discerned by an observant student.

In the past, particularly before interest rates were made subject to government manipulation and when the public generally was still comparatively innocent of the practice of gambling with securities, a regular sequence of turning points was to be observed in bond, equity, and commodity prices when a major reversal of the trend of national output occurred. Time after time bond prices

declined as interest rates were increased; equity prices then were reduced; finally, commodity prices fell as production and trade declined. The first harbinger of recovery was a rise in bond prices. Subsequently equity prices were increased, and shortly afterwards commodity prices began to firm and rise. Forecasting systems were based on this repeated sequence of developments, and considerable success was obtained by persons who observed the changing relationships evidenced by these three series. Even in current times, weakness in industrial bond prices, after an extended rise in business activity, may be indicative of a coming decline in equity prices. Yet the classic sequence of turning points in bond, stock, and commodity prices has not been a trustworthy guide since the early '20's. Presumably the sequence will not be useful unless interest rates are once again to be an accurate representation of the relationship of demand and supply in the money market and equity prices are largely determined by investors who are competent to evaluate the worth of a share in the assets of an enterprise.

In the following pages are outlined some of the important factors which were considered in forecasting the general trend and level of business activity at two important turning points in the past. The forecasts of the pattern and level of national output which were developed on the basis of these conclusions were used in estimating the sales to be obtained by the Armstrong Cork Company.

I. Important factors observable in 1932 which were a basis for expecting a higher level of economic activity in 1933.

A. Factors indicative of the degree of tension existing in the summer of 1932.

1. National output was 30 to 40% below the level of equilibrium. In this situation it was to be expected that a prolonged rise in production and trade would ensue when events were such as to precipitate recovery.
2. Equities were selling at prices substantially lower than the values indicated by a consideration of earnings and book values. Numerous corporate equities were selling for less than the apparent per share liquidating value of the enterprise concerned. In May, June, and July, the stock market experienced a selling climax, during which equities were jettisoned by, or for, many owners with little regard for possible future values. The averages were at the bottom of a major trading range.
3. There was evidence that many raw materials were selling at prices which even efficient producers considered extremely low. Among

such products were rubber, tin, wheat, flaxseed, cotton, lead, copper.

4. The 41-month cycle was at a low at the end of 1931.

5. The recession in national output had been continued for approximately as long a period as was the decline in production which occurred in the secondary depression coming after the Civil War.

**B. Factors indicative of the beginning of recovery in 1932.**

1. An intermediate upswing in equity prices began in the last three weeks of July. This rise was extended into the first week of September, at which time the Dow-Jones Industrials were about double the level obtaining in the first week of July. Volume of trading rose with increased prices—a characteristic of bull markets.

2. In August, September, and October industrial production was increased, thus ending the nearly continuous decline from August 1929 to July 1932.

3. The labor cost per unit of production was being sharply reduced from April 1932 until June 1933.

4. The combination of relatively low labor costs, low raw material costs, rising expectations as indicated by activity in the stock market, and evidence of a rise in industrial activity represented the traditional stage upon which further recovery was to be anticipated.

*Note:* Subsequent to the beginning of the recovery movement in the second half of 1932, the political administration holding national office was defeated in the November elections. In the critical period between November 1932 and March 1933, before the new administration accepted responsibility and power, the outgoing administration was not in a position to say what national policy would be in the future, while the authorities-to-be refused to state what policies would be adopted by the new regime. Consequently, the nation was without authoritative political leadership for about four months. Disturbing rumors concerning future national policy spread over the country. Two particular rumors—that the new administration would reduce the gold content of the dollar and refuse to honor the gold clause in government bond covenants—precipitated a serious decline in the bond market. One important result of this final reduction in the market price of bonds was a reduction in the market value of the assets of many banks. In this situation, with assets temporarily frozen, many banks were forced to close. The wave of bank failures which then followed is a matter of common knowledge. It is important to note, however, that economic recovery began in 1932, was only delayed by a change in political administration, and that this change apparently was the real cause for the spate of bank failures in 1933. After the new administration took office, the recovery movement was further developed.

In 1931 the management of the Armstrong Cork Company established a budget on the assumption that sales would decline about 30% in 1932. Actually 1932 sales were 5% higher than expectations. In 1932 a budget for 1933 was developed on the

assumption that sales would be increased by 6%. Actually sales increased by 15%. It is important to note three aspects of these forecasts.

1. The sales estimates used in the budget were intended to be "conservative" in the sense that sales were expected to be higher than the estimates.

2. A change in the trend of national activity was foreseen.

3. The sales estimates were revised, with the result that operations were managed with the use of more precise estimates than those indicated above.

II. Important factors visible in 1936 and in the early months of 1937 which were a basis for expecting a recession in national output in 1937.

A. Factors indicating the degree of tension existing at the end of 1936.

1. National output was near the level of equilibrium.

2. Equities were high relative to earnings and book values. There was evidence that stocks were being "distributed" by sophisticated investors. Furthermore, equity prices, as measured by the Dow-Jones Industrial Averages, were clinging to the upper limits of a major trading range with a large number of shares changing hands.

3. The demand for consumer goods had been expanded temporarily by the payment of a bonus to war veterans in the second half of 1936.

4. Raw material prices were rising rapidly during the latter part of 1936.

5. Management was disturbed by the national policy of supporting consumption by government borrowing and spending. It was commonly thought that the continued deficits would lead to higher taxes and something called "national bankruptcy." Disturbed by these ideas, among other things, management was reluctant to invest money in fixed capital assets.

6. The 41-month cycle came to a high in February 1937.

B. Factors indicative of a temporary end to recovery in 1937.

1. The labor cost per unit of production was increased rapidly after September 1936. The swift rise in costs tended to reduce earnings and thus depressed the expectations of management in regard to profits. Moreover the introduction of "sitdown strikes," as a means of obtaining wage increases, was a factor which disturbed executives and reduced the inclination to assume risks involved in investing capital in fixed assets.

2. The rate of increase in industrial production was reduced.

3. Department store inventories were increased more rapidly than sales; consequently, the turnover of department store inventories was reduced.

4. The rise in raw material prices was continued until April. In May the prices of raw materials began to decline when demand was reduced relative to supply.

5. Equity prices declined in March and broke through the lower trend line of the bull market trading range.
6. It was apparent that federal cash income would approximate cash expenditures in the early part of the year. Federal income and expenditure were being balanced at a time when management was not likely to adopt expansion policies which would offset the effects on the money supply of a reduction in government deficit financing. Consequently, the money supply was reduced in 1937 with no compensation in the form of an increase in the utilization of the money supply then existing.

*Note:* One reason why enterprise management apparently was unwilling to invest major sums in new fixed assets was a profound fear of the eventual effects of the fiscal practices followed by the political administration. Thus, at the time when federal monetary pump priming was being terminated, fear of the eventual effects of pump priming apparently tended to inhibit nongovernment expenditure for investment.

7. The combination of rapidly rising costs, an unstable overbought equity market, widespread labor disturbance, a reduction in the turnover of retail inventories, and a reduction in the money supply, was a situation in which a substantial recession in national output was a natural development.

In 1936 the management of the Armstrong Cork Company established a budget on the assumption that sales in 1937 would be 8.2% higher than those obtained in 1936. Actual sales in 1937 were 7.2% higher than the 1936 volume.

Early in 1937 the management established the policy of purchasing raw materials on a hand-to-mouth basis in instances where this was possible. In this way future inventory losses were minimized. A determined effort was made to prevent the development of excess inventories by either the company or the distributors of its products. Because of these efforts, the inevitable fluctuations in employment and profits were reduced in amplitude.

In 1937 the 1938 sales forecast was placed at a level 24% below the volume obtained in 1937. Actual sales were 21.4% less than the 1937 volume.

Early in 1938 the management decided to build inventories, purchase raw materials for an extended period, and appropriate funds for the construction of an important addition to the largest plant owned by the company. These decisions were based on the assumption that a short-term recession in national output had been completed and that the beginning of cyclical recovery was imminent.

## **CHAPTER XIV**

### **PRODUCT CLASSIFICATION**

In analyzing the prospective sales and profits to be obtained from manufacturing or distributing commodities, it is important to understand certain of the general characteristics of the products under consideration. It is desirable to know the degree to which the market for a product has been developed; to understand the relationship of a commodity to other items in a line of goods sold either by a company or by competition; to know to what extent the purchase of a commodity may be deferred by customers; and, finally, to ascertain whether or not the product is sold in small quantities to many customers or in large quantities to few customers.

#### **PRODUCTS CLASSIFIED BY DEGREE OF DEVELOPMENT**

There are differences in the degree to which the markets for various products have been developed. In some instances it may be observed that customer acceptance of a standard commodity is practically complete. In other cases the demand for a product is being expanded rapidly as more people are being educated to use the commodity and as the product is being improved. Because of these differences in markets and commodities, it is possible to classify products according to the degree to which the demand for them has been developed by education and product improvement.

##### **I. Undeveloped Products**

These are commodities which as yet have not been successfully exploited commercially. Products which are still in the laboratory or have not been introduced to the market, fall in this category.

##### **II. Developing Products**

These are commodities for which the market is being developed or expanded. Ordinarily products in this class are being improved



rapidly as a result of being tested in everyday use. Sometimes the demand for a product in the development stage may be increased even during a period in which the market for most products is being reduced.

### **III. Established Products**

These are commodities which have been developed to the point where the apparent opportunity for improving the product, bettering the techniques employed in manufacturing or distributing, or increasing customer acceptance, has been exploited to such an extent that relatively little opportunity remains. The market for an established product may be considered as being fully developed for practical purposes. The demand for established products tends to rise and fall with changes in the status of the business cycle.

An undeveloped product generally is priced with the intention of introducing the item to the market. The estimated level of future rather than current costs ordinarily is used to establish prices. The costs involved in promoting a new product and in learning how to manufacture efficiently frequently are so large as to prevent the acquisition of profit and may cause loss for some time after the introduction of the commodity.

Undeveloped commodities, if useful and produced under the direction of capable management, are changed into developing products. It follows that an enterprise possessing new commodities may be in a position to make substantial profits when the undeveloped product is actively merchandised.

Customer acceptance of developing products usually is increased rapidly. Producers of such a product, therefore, enjoy expanding markets and are not subject to the intense pressure of price competition which obtains in an industry whose members are endeavoring to utilize excess capacity by reducing prices to expand the volume of sales. The profits made on developing products tend to be satisfactory. These profits, for the most part, are a reward for the imagination, enterprise, and assumption of risk involved in producing a commodity not available before, or which customers were not educated to use, or which is being improved. In addition, the efficient producer of a developing product may expect to obtain some part of total profit as a reward for operating efficiency alone.

Established products are not subject to rapidly rising consumer acceptance. Consequently, it may be observed that excess capacity frequently is to be found in industries producing established goods. Excess capacity may result from managerial overoptimism in the past, the establishment of newer and more efficient productive facilities, or a partial absorption of the market by substitute products. No matter what the cause may be, the existence of excess capacity impels competing managers to reduce prices in an effort to obtain volume. In this situation the most efficient producers control prices for the whole industry.

Established products are those which have been subject to exploitation until, apparently, there is little opportunity except to be more efficient than the management of competing enterprises. Ordinarily the profits obtained by the producers of established products are lower than those obtained by well managed enterprises dealing in developing commodities. The profits obtained by efficiency alone generally are considered as being low and are much less than those thought to be attractive and satisfactory by investors and enterprise management.

### MANUFACTURING AND DISTRIBUTION

Some enterprises are able to produce a commodity efficiently, and yet are unable to distribute economically because the selling costs incurred would be greatly in excess of those of potential competitors. Conversely, some companies are able to distribute a commodity with efficiency but would be unable to manufacture the product in competition with other producers. In numerous situations of this kind the managers of a concern which is efficient in performing the manufacturing function may elect to have their product distributed by others; or an efficient distributor may sell commodities produced, but not merchandised, by economic manufacturers. From these examples it may be concluded that manufacture and distribution are two prime functions of enterprise which may be separated and that a company or its competitors may not be efficient in the performance of one or the other of these operations.

Some enterprises are able to manufacture a large volume of goods because they are in a position to distribute such products efficiently. In such instances the possession of distribution facili-

ties makes it possible to manufacture a product economically—if efficiency in manufacturing is dependent on volume. From this it may be concluded that the possession of distribution facilities sometimes may establish the opportunity to manufacture efficiently and profitably, but even in such cases it is evident that the functions may be separated.

Because the functions of manufacturing and distribution are divisible and profits may be attributed to the performance of each of these operations, it is possible to classify the products in a line of commodities according to their relationship in: (1) manufacturing and (2) distribution.

### **CLASSIFICATION OF PRODUCTS BY RELATIONSHIP IN MANUFACTURING**

#### **I. Structural Products**

These are commodities around which a manufacturing business is organized. Such products form a basis for the existence of both manufacturing facilities and the organization involved. The word “structural” is used to denote the fact that manufacturing facilities and organizations are largely supported by the existence of these products. Sometimes commodities in this category may be termed “major” products—although the qualitative term “structural” is to be preferred, because structural products are not always major products.

#### **II. Derived Products**

These are commodities which it is possible to manufacture efficiently because an enterprise is engaged in the production of a structural product of some kind. The opportunity to manufacture “derived” products arises from the fact that a structural product is produced. There are two general types of derived products, which may be listed as follows:

##### **A. ADAPTED PRODUCTS**

These commodities are adaptations of structural products. In such cases the structural product is altered or “adapted” to a specific end use which is different from the major use made of the structural item. An adapted commodity is one which cannot

be manufactured economically unless the structural product also is made.

## B. BY-PRODUCTS

These commodities are made by utilizing residue derived from the manufacture of structural or adapted products. The material which would otherwise be waste, when used, becomes raw material. As in the case of adapted products, it is not economic to manufacture by-products unless an enterprise is engaged in the production of structural or adapted products.

The manufacturing of structural commodities must be profitable if this kind of product is to be produced, because companies are created to manufacture and do not continue to exist over the long term if profits are not obtained. It is common practice, therefore, to price structural products with the intention of making a profit, regardless of the profits made on other items in a line. The magnitude of profits derived from the production of structural products is determined largely by the development status of the commodity in combination with the relative efficiency of the individual producer.

Derived products frequently are priced with the objects of moving a volume large enough to obtain the most economic utilization of raw materials and to maximize the absorption of factory burden. This may or may not be good practice, depending on the nature of the enterprise and industry concerned. The fact that such practice is not uncommon, however, is to be remembered when the pricing policies which may be employed by competitors are considered. Even if such pricing policies are not followed, the production of derived products enables a manufacturer of a related structural commodity to operate more efficiently. It follows that control over the manufacturing price of both derived and structural products is possessed by the manufacturer of a structural item who also produces the derived commodities.

Because control over the price of a derived product is possessed by a manufacturer of the related structural product, the management of an enterprise, which is limited to the production of commodities treated as derived products by other manufacturers, cannot expect to obtain much profit over the long term under the best of circumstances.

When the producer of a structural product also manufactures an important quantity of derived products, the manufacturing profits of both the structural and derived commodities are integrated—the result being that the total profit obtained is a complex of profits from both sources. Consequently, it ordinarily is not possible for a producer to obtain a satisfactory manufacturing profit over the long term if either, but not both, of the two different categories of commodity are produced in competition with other enterprises which produce both kinds of product.

### **CLASSIFICATION OF PRODUCTS BY RELATIONSHIP IN DISTRIBUTION**

#### **I. Structural Products**

These are commodities which form the basis for the existence of facilities and organization used in distribution. As in the case of structural products in manufacturing, structural products in distribution frequently are “major” products in a line—although not necessarily so.

#### **II. Complementary Products**

These are commodities which are sold with structural products to fill out a line of integrated or cognate goods. The distribution of complementary products frequently is undertaken to reduce the competitive costs incurred by an organization created to distribute a structural commodity. Complementary products are merchandised to obtain efficiency in the performance of the distribution function. It may be noted that complementary products often are most efficiently distributed by enterprises which did not first introduce them to the market but which adopted them as being related to important commodities already distributed.

#### **III. Transitional Products**

These are commodities which are being changed from structural to complementary products owing to changes in industry practice.. Both undeveloped and developing products frequently may be classified as structural products in distribution; but, over a period of time, established enterprises with well developed and efficient facilities for distributing take over growing businesses, with a result that the products become complementary products in an

industry even though they may be classified as structural products in the enterprises which first developed them.

Structural products in distribution, like structural products in manufacturing, generally are priced with the intention of obtaining a profit, for these are the commodities which must be profitable if a profit is to be obtained from performing the function of distribution; otherwise, it would be more economic to allow others to distribute them. Consequently, distributors of structural products tend to control the price charged for distributing.

The profits obtained from structural products distributed tend to reflect the development status of the commodity. When forecasting the probable profit to be obtained from distributing a structural product, it is important to determine whether the commodity is an undeveloped, a developing, or an established product.

Complementary products frequently are priced so as to facilitate maximum absorption of the total cost of distribution. It not uncommonly happens that established businesses possessing efficient facilities for merchandising can obtain volume in the distribution of a complementary product by undercutting the price which must be charged by competitors who developed the commodity and who use the item as a structural product. This frequently is the reason why small companies, which may be losing out in competition, are absorbed by other enterprises which use the products of the absorbed companies as complementary products in distribution. Control over the price of a complementary product in distribution is possessed by companies which merchandise a structural product to which the item is complementary.

Profits obtained from the distribution of a complementary product tend to be reduced as established enterprises take over the business with the object of merchandising a complete line of commodities. In the long run, the profits may tend to become those expected from an item which is carried merely to service the requirements of customers for other products. It is apparent that the profits obtained by an enterprise attempting to merchandise a commodity which is a complementary product in an industry will not be considered satisfactory when the company does not also distribute a suitable structural product.

Transitional products frequently are sold at prices which reflect the fact that costs are being reduced. This situation is experienced

when businesses distributing structural products absorb commodities in the transitional phase of development. At such times, control over the price of distribution is in the process of being transferred to the distributors of the structural products involved.

### **CLASSIFICATION OF PRODUCTS BY DEFERRABILITY OF DEMAND**

There are differences in the degree to which potential customers are able to defer purchasing different types of commodities. At one extreme are the material necessities of life which consumers purchase almost every day. At the opposite extreme are luxuries and durable goods, which customers may defer buying almost at will. In view of the differences in the deferrability of different kinds of goods, the following categories of commodities may be established:

#### **I. Deferrable Products**

These are luxuries, durable goods, and construction which potential purchasers may delay buying for an indefinite period. This group of products may be subdivided into:

##### **A. PRODUCERS' DEFERRABLE PRODUCTS**

These are commodities which represent capital investment on the part of producers. All industrial, commercial, institutional, and rental residential construction may be included in this class. Furthermore, a part of goods carried on inventory by producers and distributors may be so classified. This is a matter of importance in estimating the demand for a product which is carried on inventory by distributors. In certain instances a change in a manufacturer's sales volume may be attributed to a change in the inventory policy of distributors.

##### **B. CONSUMERS' DEFERRABLE PRODUCTS**

These are durable commodities and luxuries purchased by consumers. Most residential building may be placed in this category.

The demand for deferrable products fluctuates violently over the course of the business cycle. When business is high and expectations rise, the demand for deferrable products is increased at a much more rapid rate than is that for those products which the

customer cannot delay buying. When consumer incomes are reduced, or when it is expected that prices and incomes will be reduced, the demand for these deferrable products is rapidly lowered. Consequently, the demand for the raw materials, labor, and capital used in the production of such goods is subject to wide variation over the period of a business cycle. In recognition of this fact, such commodities sometimes are called "cyclical" products.

It may be observed that the capacity to produce deferrable products frequently is inadequate, relative to the effective demand, during exceedingly prosperous periods. Conversely, during periods of subnormal economic activity the capacity available for producing deferrable products is greatly in excess of the demand, although this may not be true of products for which a market is being developed rapidly.

## **II. Nondeferrable Products**

These are the necessities of life which are purchased and consumed regularly and frequently by individuals and families. Producers or distributors are not final purchasers of these goods. It is pertinent to note, however, that a product which may at first glance be classified as nondeferrable is actually a producer's deferrable product if it is purchased by a producer or distributor to increase an inventory of such goods.

The producer of nondeferrable goods does not experience the substantial fluctuations in demand which affect the operations of a producer of deferrable products over the course of the business cycle. Consequently, producers of nondeferrable products are not so greatly burdened with the problem of absorbing fixed costs during a period of declining business and, at such times, are more apt to reduce prices promptly than are the producers of deferrable products who have large fixed charges in the cost structure.

### **PRODUCTS CLASSIFIED ACCORDING TO SIZE OF INDIVIDUAL SALE**

#### **I. Products with "Lumpy" Sales**

It may be observed that the output of a given product for a particular company sometimes is sold to few customers. In extreme cases the entire output of a given product may go to a



single buyer. Such sales may be called "lumpy." The addition or loss of a single customer may cause wide variation in sales—irrespective of a change in the general economic situation.

A forecast of the sales of such a product may be based on a prediction of the customer's use of the commodity. The demand of each customer must be analyzed in terms of whether or not the customer will continue to purchase the product, from whom he will buy it, and what general economic factors will determine how much he will buy if he continues to use the commodity.

## II. Products with "Smooth" Sales

Some products are sold for many uses, through many channels, in small lots to a large number of customers. Generally the sales volume of such products is smooth in the sense that the short-

TABLE XIII

### PRODUCT CLASSES

#### Method of Classification

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
<i>By Degree of Development</i>	<i>By Relationship in Product Line</i>	<i>By Deferrability of Customer Demand</i>	<i>By Size of Individual Sale</i>
I. Undeveloped products	I. Products manufactured	I. Deferrable products	I. Products with lumpy sales
II. Developing products	A. Structural products	A. Producers	II. Products with smooth sales
III. Established products	B. Derived products	B. Consumers	
	1. Adapted products	II. Nondeferrable products	
	2. By-products		
	II. Products distributed		
	A. Structural products		
	B. Complementary products		
	C. Transitional products		

term fluctuations are comparatively minor in importance. The demand curve tends to rise and decline over a period of time in conformity with broad changes in the general economic situation. Because there are many customers for this type of product, it

sometimes will be found that losses and acquisitions of customers tend to balance over short periods of time. The trend of the competitive position of an enterprise, as measured by its percentage of industry sales, is highly important in forecasting the sales of these products.

In Table XIII are listed classes into which various commodities may be cataloged. The categories given are of importance in determining what different factors must be analyzed in the process of developing forecasts used in company planning.

## CHAPTER XV

### ASSEMBLING THE SALES FORECAST

The organization of the various kinds of information and judgments which are the elements of a logically developed sales forecast is the subject of this chapter. Sales forecasts formulated by the methods described may be used as estimates of income in operating budgets or may be employed to determine future requirements of raw materials, personnel, organization, capital, buildings, equipment, and other matters which are involved in managing a business.

The possession of a comprehensive "estimate of the economic situation" of professional quality is essential for the development of an adequate sales forecast. It will be found that an estimate of the probable future state of economic affairs will be most useful if it is established by persons who are familiar with the problems of a business for which a sales forecast is to be made. Otherwise, economic developments which are not of major importance in the economic situation as a whole, but which will have a substantial effect on the operations of a particular enterprise, either may be ignored or may not be properly evaluated in relation to the business under consideration.

#### THE BASIC ASSUMPTIONS

As a preliminary step, a brief written description of developments in the economy of major importance to the business is abstracted from the "estimate of the economic situation." This summary may be termed the "basic assumptions" and is to be used by all persons engaged in the task of forecasting sales.

By establishing a formal statement of assumptions to be used in making various estimates—which in total comprise a forecast—all persons concerned are able to use the same general premises regarding conditions in the economy as a whole. Consequently, one sales manager will not base his judgments on the assumption

that national income will be increased by 10%, while another assumes that national output will be reduced; nor will some executives look for rising prices while the purchasing management forecasts lower raw material costs on the assumption that the general level of prices will be reduced. Because component estimates are developed from integrated concepts, the entire forecast is made most representative of the sales which may be anticipated if the basic assumptions are valid. If the basic assumptions should be changed in the near future, the entire forecast may be revised with both celerity and accuracy because the important assumptions on which it is based are understood.

On some occasions it will be found that the resolution of certain future conditions of importance in the economy is not determinable at the time when a forecast is made. In such cases arbitrary assumptions are employed. For example: If it is thought that the selling prices to be obtained for particular commodities will be increased in the intermediate future owing to rising cost prices, it may be expedient to assume that both cost prices and selling prices will be unchanged over the term of the forecast. In this instance the magnitude of the probable deviation from the forecast should be analyzed and treated as a special adjustment to the formal sales estimate, but the fact that probable price increases are not to be incorporated into a formal sales estimate should be clearly stated in the basic assumptions. While it may be advisable to deal with true imponderables, which will affect sales and profits to an important degree, by using arbitrary assumptions, it is well to bear in mind that the error in a forecast resulting from the use of arbitrary assumptions should be corrected as soon as possible. Furthermore, a lavish use of arbitrary assumptions in forecasting is the mark of inability to employ economic theory in practice. Numerous prognostications of economic developments made on a base of wishful assumptions have been useless because the estimates were not related to anything real either on earth or in heaven!

The basic assumptions to be used in making a sales forecast should be considered, criticized, revised if necessary, and approved by top management. After final approval, they are reproduced and distributed to all persons involved in the process of developing the forecast.

### THE TENTATIVE FORECAST

After the basic assumptions are approved by top management, tentative estimates are made of the probable sales of the structural products in the line of commodities sold. These tentative estimates then are subjected to review and criticism and, after final revision and approval, become the forecasts used in company planning.

In developing tentative forecasts, it is not advisable to spend time estimating the sales of minor or complementary products. In most instances the sales of complementary products vary directly with changes in volume of demand for structural commodities. Consequently, estimates may be derived from forecasts of the demand for the structural products concerned.

### NATIONAL AND COMPANY ACTIVITY

The technique employed in estimating the domestic demand for structural products involves studying the relationship of commodity sales and prices with measures of the activity in national markets. Table XIV, entitled "Interrelationship of Economic Factors Used in Business Forecasting," is designed to outline how changes in the domestic sales of a commodity may be related to changes both in national output and in the monetary structure of the economy. In this system of equations, the relationships are simplified to an extreme; yet, in a real sense, the interrelationship of company sales and developments in the national economy is indicated in this exhibit. It may be noted that values for the monetary factors (I, Money) vary directly with changes in the values for national output (II, National Productive Activity). Company domestic sales, modified by both inter- and intraindustry competitive relationships, rise and fall with changes in the values listed under I and II. A change in the level of bank loans affects company unit sales volume if all other factors in IA and III remain unchanged. A substantial change in salary and wage payments, in the general price level, in government expenditure, in the money supply, in the use or turnover of money, all affect either the price at which a company sells a commodity, or the unit volume of sales, or the competitive position of the enterprise or industry.

It is possible to use mathematical values in all of the equations in Table XIV. The best results, however, are not obtained by following this procedure exactly.

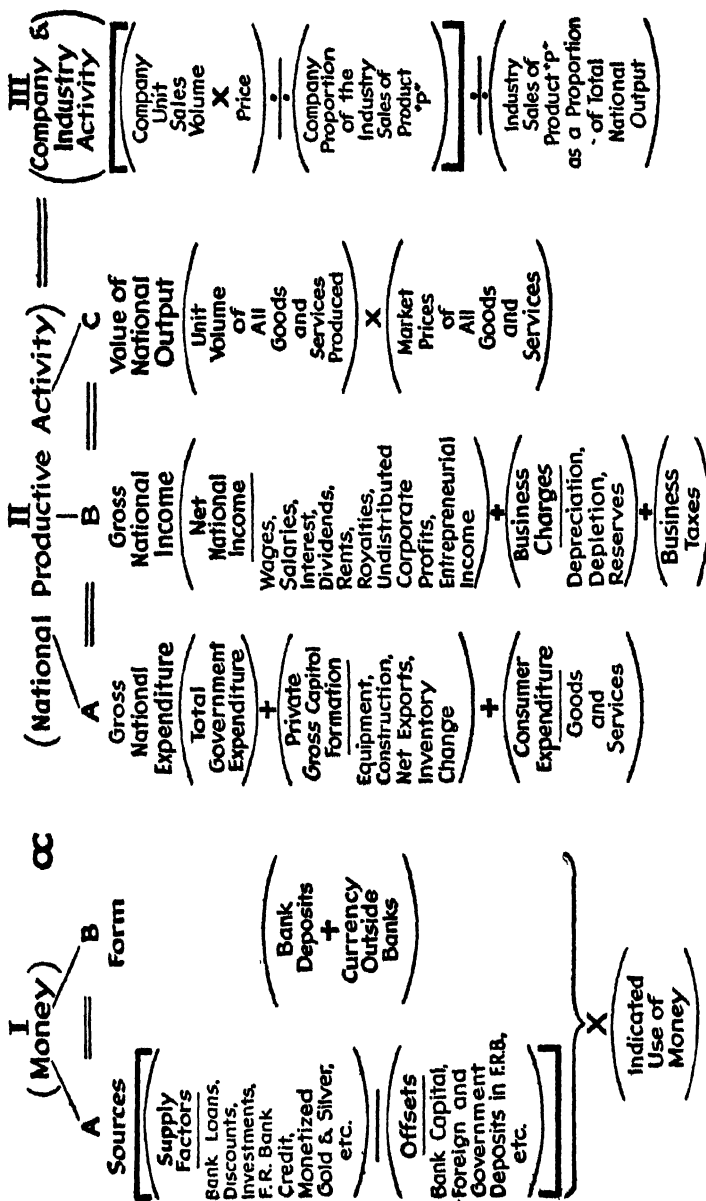
In practice, the basic "estimate of the situation" is converted into statistical models, from which are taken mathematical values representing broad measurements of the domestic market for the products of an industry under consideration. Important statistical series commonly used as measures of the national market for the products of various industries are:

- National income (Table I).
- Income payments (Table III).
- Gross national expenditure (Table VIII).
- Disposable income (Table III).
- Consumer expenditure (Table VIII).
- Consumer expenditure for durable goods (Table VII).
- Retail sales (Table VII).
- Gross capital formation (Table VI).
- Expenditure for construction (Table VI and Public Construction).
- Agricultural income (Table I).
- Industrial production.

These, and other statistical series, become the independent variables in equations used to calculate the domestic consumption of products produced by various industries. In some instances, a product is produced by an industry which is a subindustry of a major industry. This situation is common in connection with commodities used in construction. In such cases, it will be found that the best results will be obtained when broad measures of national economic activity are correlated with the output of major industries, and the output of these major industries then is related to the consumption of a product produced by a subindustry.

The tentative sales estimate for a product should be composed of a forecast of the unit volume of sales to be anticipated and the price at which the commodity probably will be sold. It is desirable first to estimate the probable unit volume of sales for an industry and to derive from this estimate an approximation of the unit sales volume to be obtained by a company. In some instances it will be found that the unit output of an industry may be related to a measurement of the national market reported in dollars. When this situation is experienced, the independent variable must be deflated by means of an appropriate price index,

TABLE XIV  
INTERRELATIONSHIP OF ECONOMIC FACTORS USED IN BUSINESS FORECASTING



so that a series in terms of constant dollars may be obtained to which the unit output of an industry under consideration may be related.

### CORRELATION

The correlation technique is used to calculate mathematical relationships between appropriate measures of national and industrial activity. Ordinarily a simple regression is computed from values representing: (1) The output of an industry in the past, and (2) some form of national activity which is indicative of the market for the product under consideration. The formula for the regression equation is:  $y = a + bx$ , in which  $x$  is the independent variable and  $y$  is dependent.

In using such measurements of relationship, it is advisable to work with statistics covering at least one major cycle in business activity. Regressions based on experience covering less than a complete major cycle are to be used with extreme care, because a regression calculated on the experience of a complete cycle might be substantially different.

Ordinarily a series of two or more equations must be developed to relate the output of an industry to broad measures of national economic activity. In each equation in a sequence the statistics are those pertaining to a smaller segment of the economy. In other words, analysis is directed from the abstract, or general, to the specific, with the final figures representing the sales of a particular product by a certain company. The following are the first two equations in a series used in estimating company sales of metal closures and are examples of how the coverage of the statistics employed is narrowed in succeeding equations.

<i>Equations</i>	<i>Independent Variable</i>	<i>Dependent Variable</i>
I	National income (constant dollars)	Shipments of glass containers (selected lines) (units)
II	Shipments of glass containers (selected lines) (units)	Industry shipments of metal closures (units)

The use of multiple correlation is not advisable as a means of relating industry activity to a number of values used as indexes



of the market. The use of multiple correlation for this purpose is of questionable value in forecasting, because deviations from the values obtained by using a regression equation are of great significance. When the technique of multiple correlation is applied, involving the use of three or four independent variables, the deviations of industry data from calculated values are almost without meaning. In practice, it will be found that statistics of industry activity can be related to some measure of the broad market so that deviations are logical, understandable, and useful.

The selection of a measure of national activity to be used as an independent variable in a regression equation should be made on the basis of logic rather than mathematics. Changes in the independent variable should be an index of changes in the market or in the demand for the products of an industry under consideration. The independent variable should be a "reasonable" selection. Nor is the coefficient of correlation to be considered as being of much importance. In practice it is better to use an independent variable which is a logical measure of the market rather than an independent variable which will yield a high coefficient of correlation.

### DEVIATIONS

It is to be expected that measurements of the actual output of an industry will deviate from the values calculated by using a correlation formula. At least four causes of such deviations may be isolated. These are: (1) Secular change in acceptance of the commodity, (2) change in customers' inventories, (3) errors due to inaccuracies in the statistics, and (4) inadequacy of the independent variable as a measure of the market.

If an independent variable first employed is not a proper measure of the demand for a product, a more useful index should be selected. By using common sense, appropriate independent variables can be chosen for most commodities sold in a national market. Consequently, it will be found that deviations due to the lack of a proper independent variable generally will not impede the development of reasonable forecasts.

Deviations due to inaccuracies in the original statistics will be experienced. Sometimes an independent variable will be revised, with the result that a better correlation can be obtained with revised figures. Unfortunately, many of the important estimates

of national economic activity are based on sophisticated guesswork. In some instances these estimates of aggregate values are obtained by using moving averages. Furthermore, inaccuracies result from the employment of the sampling technique. As a result of these and other circumstances, irrational deviations from the values calculated from regression equations are not uncommon. In general, however, these statistical aberrations are not of great importance—so long as the mathematics are used with common sense.

Over the short term the most important deviations from computed values result from changes in customers' inventories. When a recession in business is originated, distributors of finished products customarily attempt to reduce inventories; subsequently sales by manufacturers decline by more than the amount which would be indicated by the reduction in consumption. Conversely, during a period of recovery, distributors increase inventories, and production is increased more rapidly than consumption. Likewise, ultimate consumers tend to reduce their inventories of deferrable products during recessions and to increase their accumulations of commodities when they expect that their incomes will be augmented. Because the inventory practice of customers is a major factor causing deviation from regression values, it is important to determine whether it is reasonable to assume that inventory practice actually is the major cause of a deviation observed in a series being used. If it is concluded that inventory variation is the important factor, the probable deviations to be expected in different cyclical situations are to be determined. One method of estimating the probable magnitude of such residuals is to record actual values as a percentage of calculated values. Thus, if the output of an industry was 109% of the level computed as the regression value in the period under consideration, it would be concluded that the extra nine points were due to an increase in the inventories of customers. By calculating the annual ratios between actual and computed values, a series can be obtained indicative of the deviations to be expected in different situations. By using these concepts, adjustments can be made to calculated values in future situations.

It will be found that the deviations of actual from calculated values, obtained when using the regression technique, are of great importance. And, although the statistician may develop formulas

which will be useful in determining the probable magnitude of future deviations, the most accurate forecasting will be done by those who use judgment as well as mechanical aids in establishing estimated deviations. Personal judgment is required in making a useful "estimate of the situation," and judgment again is necessary to establish the expected deviations from computed values when the correlations are used in forecasting for practical purposes.

### ORIGINAL AND REPLACEMENT DEMAND

In some instances products are sold to both original and replacement markets. Practically all durable goods are sold either to some customers who are making an original purchase or to others replacing deteriorated goods bought in the past. Each year a large number of automobiles are sold to replace vehicles which have been deteriorated in the estimations of the owners. The same is true of various articles used in the home. Industrial equipment and all construction, also, are sold to both an original and a replacement market.

It will be found that the sales of products sold to these two markets will vary directly with changes in national income or some similar broad measure of the volume of demand. Regardless of whether a commodity is sold for replacement or to a new market, the volume of demand will vary according to changes in national economic activity. It will be found, however, that sales to a new market will show evidence of the effects of an increase in the acceptance of the commodity. The sale of a product which may be classified as a "developing product" will rise rapidly during periods when national economic activity is being increased and will show the effects of an increase in acceptance even when national economic activity is being reduced. Secular change in the acceptance of a product may be estimated by calculating the trend of the deviations or residuals when these are arranged in chronological order. This technique is outlined on page 72. In some cases it will be obvious that the secular trend of acceptance represents a change in the position of a commodity in the field of interindustry competition.

Replacement demand fluctuates with variations in national economic activity and is modified by the magnitude of the stock of goods which may be replaced. From time to time efforts are

made to estimate replacement demand by using the concept of a fixed replacement cycle. It is thought that, by this means, future fluctuations in replacement demand can be predicted. The results derived from such efforts have not been useful. In practice, customers vary their expenditure according to their expectations—and not primarily because they purchased a specific commodity on a certain date in the past.

When forecasting the probable demand for both product replacement and original use, it is advisable to make a separate estimate of sales to each of these two markets.

### EXPORTS

The technique described in the foregoing paragraphs should not be employed to estimate probable sales to an export trade. In many instances only a small proportion of finished commodities produced by an industry will be sold for export. When this is true, reasonable estimates may be made by ignoring exports and considering that the sole important market for the commodities concerned is represented by domestic demand.

In cases where an important proportion of the output of an industry is exported, it is necessary to forecast sales to the domestic market by the methods described and to establish forecasts for the volume of exports on an entirely different basis.

Forecasts of exports should be developed by an analysis of the conditions in the consuming markets. Particular emphasis must be placed on the political factors which either inhibit or encourage trade in such markets. In addition, the condition of the financial mechanism by means of which foreign trade is to be financed must be studied in detail, for, in the modern world, this sometimes is a most important factor.

### COMPETITIVE POSITION

Once an estimate of the probable sales of an industry has been established, the next step in forecasting procedure is to determine the proportion of industry sales to be obtained by a particular company. The competitive position in an industry normally is measured by the percentage of industry sales obtained. A forecast of this percentage in the future should be established with the

considered advice of the sales managers responsible for the merchandising of the product under consideration.

Ordinarily, the annual percentages obtained in the past are reviewed and an appropriate figure is selected to indicate the possible competitive relationship in the future period. In developing this judgment, the forecaster should review with the sales management the tentative estimates established by integrating industry sales with measures of national economic activity. In an informal conference with the sales management, a realistic figure representing future competitive position should be established. Then, the estimated unit sales by the industry is multiplied by the percentage representing the probable competitive position of the company. The figures obtained represent a tentative estimate which may be used to estimate raw material requirements, to indicate capacity requirements, and for various other purposes.

In some cases it may be found that no valid estimates of industry sales are obtainable. In such instances, company sales may be related to broad measures of national activity by the regression technique. When this procedure is employed, however, the fact must be borne in mind that changes in competitive position may have been ignored in making the calculations. As a result, reasonable adjustments should be made to allow for both past and prospective changes in this factor.

### SELLING PRICES

Before selling prices can be established for use in extending the unit volume estimates to obtain forecasts of dollar sales, it is necessary to determine the probable trend and level of cost prices. The special studies needed to establish reasonable estimates of cost prices should be completed by the time the estimates of unit volume are available. Estimated selling prices may be determined on the basis of judgments concerning the competitive position of the company in the industry, the elasticity of demand for the product under consideration, the effect of changes in cost prices, the profit desired or possible, etc. The co-operation of the sales management is essential in this procedure.

### SUMMARIZATION OF TENTATIVE FORECAST

Finally the tentative estimates of unit volume are extended to obtain preliminary forecasts of dollar sales. Rough estimates of the indicated sales of complementary or minor products then are established. Forecasts of the dollar sales of various products in the company line are summarized, and a tentative estimate of the future total dollar sales of a company is obtained. This forecast is now ready for formal review and adoption by the management.

Table XV is an example of how the various statistics used in the technique described can be organized. This table was first published in "Markets after the War" by S. Morris Livingston. The selection of gross national product as an independent variable should not be taken to indicate that all industry estimates should be related to this measure. In practice, a majority of the forecasts developed in the Armstrong Cork Company are based on other measurements of national output. The use of this table and the development of the figures involved are described in "Markets after the War," published by the Department of Commerce in March 1943.

### THE FORECASTING COMMITTEE

In different companies various means may be devised to permit a complete review and adoption of the tentative forecast by the several executives who are responsible for the performance of various managerial functions. In the Armstrong Cork Company a committee called the forecasting committee is assigned this task.

Members of the forecasting committee are: the vice president and controller, the treasurer, the manager of production planning and inventory control, and the economist. The formal meetings of the committee are attended by the manager of the budgetary control section of the controller's department and by the various general managers and their assistants who are responsible for the sale of the products being considered in the meeting which they attend.

Several weeks before formal meetings are held, special forms are issued to the sales managers, together with a statement of the basic assumptions on which the forecast is to be developed. These forms are designed to standardize the estimates which are

TABLE XV

TABLE SHOWING USE OF GROSS NATIONAL PRODUCT IN ESTIMATING  
ARMSTRONG CORK COMPANY'S SALES OF PRODUCT X

I		II		III				
Gross National Product		Industry Sales of Product X		Company Sales of Product X				
A	B	A	B	A	B	C	D	
Current Prices Billions	1940 Prices Billions	Actual Thousand Units	Computed Thousand Units	As a Percentage of 1940— Per Cent	Unit Sales Thousand Units	Average Selling Price Per Unit	Dollar Sales	
1932	55.4	7,511	8,300	90.5	1,893	\$0.530	\$1,003,290	
1933	54.8	8,516	8,650	98.5	2,086	0.567	1,182,762	
1934	63.8	10,919	9,900	110.3	2,729	0.601	1,640,129	
1935	70.8	11,225	10,950	102.5	2,997	0.613	1,837,161	
1936	81.7	13,014	12,875	101.1	3,123	0.615	1,920,645	
1937	87.7	13,339	13,300	100.3	3,842	0.550*	2,113,100	
1938	80.6	12,285	12,410	99.0	3,575	0.545	1,948,375	
1939	88.1	14,100	14,100	100.0	4,061	0.547	2,221,367	
1940	97.1	14,718	15,400	95.6	4,356	0.540	2,352,240	
1941	119.5	18,902	18,520	102.1	5,860	0.544	3,187,840	
†194?	142.0†	23,800	23,800	100.0	6,972	0.540§	3,764,880	
				29.4		0.594	4,141,368	

\* The company elected to sell a larger proportion of its output of product X through agents. This change reduced the average selling price and increased the proportion of the industry business obtained by the company.

† Estimated.

‡ Arbitrary figure.

§ Two estimates of possible prices in 194?

submitted by the sales managers and contain spaces for an estimate of sales during the current half-year period, during the future six-month period by months and in total, and during the next six-month period by quarters and in total. Sales are indicated in terms of units wherever possible; the probable average price is forecast, and the units are extended by the average price to obtain estimates in dollars.

In the case of structural products, the estimates turned in on these sheets ordinarily are identical with the tentative estimates which were developed by the methods described in the first part of this chapter. At the meetings of the forecasting committee, the estimates are reviewed and criticized by all persons present, and then forecasts which are agreed upon are established. In instances where the forecast is not to be used in the budget, the estimates without further review or approval are turned over to whoever is designated to use them in company planning.

When the forecast is to become the basis of an operating budget, the estimate is taken to the president's office for review, possible revision, and approval. Upon being approved, the estimate is used as a final formal forecast and is subject only to such revision as may be necessary and indicated through studies made by the budgetary control section. In numerous instances the profit projections made by this unit of the organization indicate that certain changes are desirable in the assortment of commodities to be produced or in the selling prices to be charged. When such proposed changes are approved by the management, the formal forecast is revised to conform with such changed procedure.

It should be noted that formal short-term sales estimates obtained by the technique described in the foregoing paragraphs are not adequate for the specialized purposes of continuous production planning. The forecasts used in production planning must be subject to revision on an almost daily basis. Furthermore, the sales estimates employed in controlling production must be established not only with regard to the probable demand for products but also with a detailed knowledge of the capacities available for servicing sales. Frequently a definite bias must be injected into the forecasts used in production planning, so that manufacturing operations will be conducted in a manner which will permit the most efficient utilization of manufacturing capacity, at the same time giving maximum service to customers and minimizing the



risks involved in the investment of capital in inventories. A proper co-ordination of risks, capacity, and customer service can be accomplished only by the use of special forecasts designed for this particular purpose alone.

### FORECAST TIME PERIODS

A sales forecast, of course, may be made for any period in the future. One useful forecast is an estimate of the high level of sales which may be obtained during the next several years. This estimate is of particular value in determining possible and probable capacity and capital requirements in the future.

In the Armstrong Cork Company a formal sales forecast, to be used in developing an operating budget for the coming calendar year, is established during the month of October. In the development of this forecast, the complete procedure described in the foregoing paragraphs is employed. For many years this annual forecast was the only formal estimate covering all products sold by the company. During recent years a complete formal revision has been made to the October estimate during the month of May.

### FORECAST REVISIONS

The May estimate is intended to provide an evaluation of probable sales during the first six months of the future calendar year and to revise the established forecast for the second half of the current year. By developing a formal estimate once a year and revising it after the passage of six months, the management of the Armstrong Cork Company never is without a detailed estimate of expected sales for at least six months in the future. From time to time informal revisions are made either to reflect the effects of developments which were not anticipated when the forecast was made or to incorporate into the forecast changes made in managerial expectations. On the basis of these revisions, the profit projections are changed.

When formal sales estimates are first established, they may be used for production planning. This is particularly true of production plans made for the coming year as a whole. It will be found that shortly after the formal estimates have been developed it will be necessary to revise numerous component product estimates

for the purposes of production planning. As these revisions to the original forecast are made, they become the specialized forecasts used in controlling production and inventories, and in estimating raw material requirements.

Formal sales estimates are used to establish a monthly cash budget for financial operations. After the passage of a few months, however, a more accurate cash budget can be developed by revising certain parts of the formal forecast. Consequently, the revisions made to a formal sales forecast become the sales estimates used in developing the short-term cash budgets employed by financial management.

## CHAPTER XVI

### CONCLUSION

When the utility of economic forecasting is discussed by experienced businessmen, the prevailing opinion frequently is similar to that expressed by the farmer, who, on seeing a giraffe for the first time, exclaimed, "There ain't no such animal." The frequency with which such judgment is encountered indicates that competent forecasting is not common and that, at the present, there are not a large number of business enterprises employing personnel able to perform the function on a professional basis.

But the question of whether or not economic forecasting can be useful is not a pertinent subject for consideration. The real problem which businessmen face is how to forecast economic conditions with results which are reliable enough to be used in controlling operations.

In the foregoing chapters a practical forecasting technique has been described. The methods outlined have been practiced for many years to develop the information and judgments used in managing the operations of the Armstrong Cork Company. Although some of the technique may be unique, a large part of this procedure is being followed in other companies. Furthermore, in future years the managers of an increasing number of enterprises probably will adopt similar forecasting procedures and will assign the function of business forecasting to specialized personnel.

Doubt concerning the utility of economic forecasting frequently exists because the skeptics do not understand what a competent practicing economist can and cannot do, what sources and kinds of information may be used, and, sometimes, what factors determine the volume of trade and the trend of prices. It is amazing how many businessmen who would not expect a lawyer to develop an opinion on a legal matter for them during a casual conversation, or who would not think it reasonable for a physician to give them a physical examination on a street corner, will ask a

professional economist, "What do you think of the outlook for business?" two minutes after first meeting him. Ordinarily the answers to this question, posed in these circumstances, are worth about what they cost.

In other instances businessmen are doubtful about the utility of economic forecasting because they have had experience with failure in the performance of this function. The causes of error in business forecasting are several and are worthy of comment.

Failure will be experienced at the times when forecasts are most useful unless the individuals performing the function really understand the factors with which they must deal. Persons performing the work of a practicing economist in business must possess an adequate knowledge of economic theory, business practice, finance, and statistical procedure, and must know where to obtain pertinent information. They must have contact with other professionals engaged in substantially the same type of work. From these contacts they obtain both information and competent criticism.

The temperament of the individual who is able to develop valid economic forecasts ordinarily is quite different from that of persons who make the best salesmen, production men, or popular leaders. He must be immune to the efforts of masters of the art of persuasion. He must be unmoved by the tides of mass opinion but must recognize them and allow for such forces in developing his judgments. Since the engineering of public opinion has been professionalized, it is particularly important for a person engaged in forecasting to subject commonly held opinions to the most searching criticism. Moreover, the practicing economist must subdue his hopes, desires, and fears in regard to the future economic situation to the point where they do not affect his ability to reason or recognize factual evidence. He can make no graver error than to permit himself the luxury of optimistic or pessimistic emotions concerning economic developments. Finally, although the economist must be almost inhumanly dispassionate, he must not allow this facet of his personality to prevent him from becoming an effective member of an organization. Economic forecasts made by persons who lack these personality traits are apt to vary widely from actual developments in crucial periods.

The development and use of adequate economic forecasting by business enterprise may be expected to become a factor tending to

stabilize productive activity and employment. While the great booms and depressions in the economy will continue to be generated by mass psychology, political conflict, and manipulation of the currency, competent economic forecasting by business management will tend to set limits to the extent to which inflationary and deflationary excesses will be pursued.

Finally, competent forecasting will better enable management to perform the primary function of privately owned business—namely, to provide people with the goods and services which they want and are able and willing to buy. The use of properly developed forecasts, also, will facilitate attainment of the object of privately owned business, which is to make a profit. Those enterprises which are best able to forecast the demand for their products will possess a competitive advantage, for their managers will be better able to avoid uneconomic investment, to produce and distribute more efficiently, and to provide customers with commodities at lower prices than competitors. In these ways those managers who have the benefit of the best economic forecasting will be in a position to perform their social function more efficiently than their less progressive competitors and, as a result, will be able to make more profit.

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